

# **Gender Dimensions of Rainwater and Livelihoods Management in Rural Crop-Livestock Systems.**

## **Practices and Innovations in the Nakanbé River Basin in Burkina Faso.**

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## **1. Abstract**

Environmental changes like increasingly variable rainfall patterns and degrading land resources crucially affect women's and men's livelihoods in rural crop-livestock systems in the Burkinabe Nakanbé basin. They are compounded by economic changes like increasingly dominant markets with rising prices for various agricultural products and livestock, and by social changes such as high population growth leading to increased competition over scarce land and water resources. The resulting vulnerability context affects local rural women's and men's livelihood strategies, implying various interdependent gender-differentiated opportunities and constraints for their practices in agriculture and livestock keeping.

This study analyses gender dynamics of practices in agricultural production, access to and use of land, water, knowledge, necessary input resources and markets, as well as respective innovations. Data was acquired by an empirical qualitative research in the context of the *CGIAR Challenge Program on Water and Food* and applied methods include semi-structured personal interviews, field observations and various participatory methods in the course of focus group discussions.

Results suggest that access to crop and garden land, control of harvest outcomes and access to financial capital are particularly determined by male inheritance rights, gender-differentiated household fields and men's improved access to participation in development cooperation initiatives. Furthermore, opportunities to increase crop yields via access to material and immaterial input resources are constructed differently, while they are crucially necessary for men as well as women to fulfil their different societal roles and responsibilities. Especially access to physical capital including fertilizer, improved seed varieties, agricultural tools and livestock are important to provide for gender specific needs, households' sustainment and would provide disadvantaged women with considerable empowerment potentials.

## **2. Research context**

This study is based on research on development in the West African Volta river basin. This area is mostly made up of the countries of Burkina Faso and Ghana (80% to 85% of its 395,098 km<sup>2</sup>). Smaller parts of Benin, Côte d'Ivoire, Mali, and Togo are also part

of the basin, which is drained by the three main tributaries of the river Volta, namely the Black Volta, the White Volta, and the Oti Rivers. In the northern, Burkinabe part of the basin, those rivers and their sub-basins are referred to as Mouhoun, Nakanbé, and Pendjari, respectively (Douxchamps, Ayantunde, & Barron, 2012, p. 5; Kirby, de Condappa, Mainuddin, Eastham, & Thomas, 2010; Lemoalle & de Condappa, 2010, p. 655; Terrasson & Mojaisky, 2008, p. 6).

The Volta basin can be roughly divided into four climatic zones, according to the amount of average annual rainfall. From the lowest rainfalls of below 500 mm in the North to more than 1,100 mm in the South, these cover the Sahelian, the Sahelo-Sudanian, the Sudanian, and the Guinean area (Barry, Obuobie, Andreini, Andah, & Pluquet, 2005, p. 16ff.; Terrasson & Mojaisky, 2008, p. 5f.). Rainfalls are subject to distinct seasonal variations, with one wet season in the northern part peaking around July and August, and two wet seasons in the South. In addition to that, rainfall and flows vary considerably from year to year (Kirby et al., 2010, p. 7ff.; Lemoalle & de Condappa, 2010, p. 659).

Around 85% of the basin's land is grassland, which includes shrubland and barren land. These areas take up 81% of the basin's mean annual input water by precipitation. Rain-fed cropland, the next most extensive land use, accounts for 14% of the basin's land and uses 8% of its available water. Furthermore, woodlands, including forests, wooded wetlands, bare and urban ground, account for 1.5% of the basin and 2% of the regional water use (Kirby et al., 2010, p. 19).

Agriculture is an important economic sector and source of livelihood for the approximately 20 million people living in the Volta basin. The average population density is around 48 persons per km<sup>2</sup>, and 64 to 88% of the basin's population live in rural areas, where poverty is especially high (Lemoalle & de Condappa, 2009, p. 655).

This applies particularly to landlocked Burkina Faso, despite its rising real GDP growth of over 5% in the last few years. This economic growth was essentially driven by the mining sector, though the primary and the tertiary sectors still dominate the local economy "with their respective shares of GDP at 35% and 38% in 2011" (AfDB, OECD, UNDP, & UNECA, 2012, p. 4). The agricultural sector, including forestry, fishing, and hunting, accounted for 35.4% of GDP in 2011, after declining from 39.2% in 2006 (AfDB et al., 2012, p. 3f.). Still, the agricultural sector is the most important employer, and accounted for 92.4% of total employment and even 93.5% of female, as compared to 91.4% of male employment, in the 1990s (Andah & Gichuki, 2005, p. 9).

Even though these percentages have dropped during the last decade, along with changes in means of production, market access, and other employment opportunities, agriculture continues to be extremely relevant for local livelihoods, especially rural ones.

About 33% of Burkina Faso's total land is arable, of which only 49%, or 4,700,000 ha, are cultivated. Popular food crops in the rain-fed agriculture of Burkina Faso are sorghum, millet, and maize. Additionally, cotton, groundnuts, sedentary livestock, and mobile herds, consisting of sheep, goats, and cattle, contribute to local cash income (Amankwah et al., 2012, p. 2; Kirby et al., 2010, p. 12; Lemoalle & de Condappa, 2010, p. 659).

Problematically, current water resources are already insufficient to meet the needs of the growing population in the region and water availability is further crucially affected by changes in the region's climate (McCartney et al., 2012), and also by human activity such as overuse and misuse of water resources. Out of the necessity to meet their own and their livestock's nutritional needs, smallholder farmers overexploit natural resources like water or land. This practice leads to a vicious circle of overuse, degradation, and reduced agricultural productivity, leaving the rural population even more vulnerable and insecure (Samari, 2011, p. 4). Other activities such as massive deforestation, forest destruction, and the removal of vegetative land cover threaten biodiversity, reduce the soil's rainwater retention, increase soil degradation and droughts, and as a consequence also dry up rivers, leading to unsustainable water resource use (Andah & Gichuki, 2005, p. 35; Samari, 2011, p. 4). "Water scarcity arises largely as a result of diminishing precipitation, reduction in river flows, falling water tables, and an increase in the amount of evapotranspiration" (Andah & Gichuki, 2005, p. 35). This is especially problematic in northern Burkinabe regions, where rivers do not flow year-round and some wells and groundwater boreholes dry up during certain months (Andah & Gichuki, 2005, p. 29). But almost all rivers in Burkina Faso, including the Nakanbé or White Volta, as it is called further south in Ghana, except for the Mouhoun or Black Volta, are dry for about two months a year (Andah & Gichuki, 2005, p. 2).

Rain-fed agriculture is the rural smallholder population's main activity (Lemoalle & de Condappa, 2009, p. 72) and rain-fed mixed crop-livestock systems account for the main providers of food in the Volta basin. These factors, in addition to relatively low agricultural productivity, compromise the achievement of food and water security and hence also that of economic, environmental, and political dimensions of human

security, which are necessary for poverty reduction, health, and human development opportunities.

## **2.1 Research challenge**

“Advancing gender equality is not only the right thing to do, and it’s more than an economically-smart thing to do. It’s also necessary in order to unleash agriculture’s full potential for improving lives in developing countries” (CGIAR Fund, 2013). While the gender gap in agriculture – women’s and men’s different opportunities in meeting their various responsibilities and livelihood needs – is increasingly recognised as a significant development obstacle on an official level, gender roles and relations still account for major challenges in natural resources management, development, and poverty reduction initiatives (Amerasinghe & Van Koppen, n.d.; Douma, 2012, p. 8f.; The World Bank, 2009; Wahaj, Hartl, Lubbock, Cleveringa, & Nepveu, 2007).

Especially in the context of scarce resources, “[p]ressure on resources due to population growth, climate change, pollution, and a tendency for large-scale interventions can reinforce and aggravate current gender inequalities” (Douma, 2012, p. 8). In the case of water-scarce regions like Burkina Faso, competition increases inequity in access to limited water resources, whereby poor rural women, who are mostly responsible for local water management, are disproportionately affected (Tandon, 2007, p. 10f.; Wahaj et al., 2007, p. 2). Therefore, the responsibilities, needs, and wants of all members of a society, regardless of their gender or status in the social power structure, have to be taken into account. This will not only enable all women and men to access natural resources and to benefit equally from water management innovations, but it will also have positive effects on the overall well-being of poor households, by reducing poverty as well as food insecurity, improving health and wealth benefits to the household, increasing productivity at farm level, and thus contributing to the agricultural gross domestic product of countries (Amerasinghe & Van Koppen, n.d.; International Food Policy Research Institute, 2000; Wahaj et al., 2007, p. 2).

Socially constructed “[g]ender roles shape men’s and women’s decision making in all areas of household and community life, from agricultural decisions such as what crops to grow or when to harvest, to how to earn or spend income, what foods to eat and how to raise their children” (Nelson & Chaudhury, 2012, p. 8). Furthermore, gender roles

result in different, society-specific responsibilities and activities of men and women. In relation to agriculture and water management, men's fields of work mostly relate to cash crop irrigation and livestock, whereas women are often responsible for water management for domestic uses such as drinking, washing, sanitation and hygiene for good health, but also for productive uses, which include irrigation of staple and food crops, kitchen and home gardens. Additionally, women's tasks also include the production and provision of food, which makes them largely responsible for families' and communities' food security. Despite their important multiple roles in agricultural production, women have limited "access to productive resources such as land, water, fertilizer, credit and other inputs" (Wahaj et al., 2007, p. 7) and also face specific constraints in the control of these resources, especially of those with higher monetary value, that are generally controlled by men or by male-dominated institutions (Douma, 2012, p. 8; Wahaj et al., 2007, pp. 3f., 12ff.).

It is important to recognise that "women are not only farm workers, but also decision makers in crop production, livestock rearing, fisheries and forestry" (Amerasinghe & Van Koppen, n.d., p. 1). This is especially the case in many sub-Saharan African regions, where women are the main producers of food crops and staples, and where, in gender-based farming systems, women and men cultivate separate plots simultaneously (Alderman, Hoddinott, Haddad, & Udry, 1995; Farnworth, 2012, p. 5; Wahaj et al., 2007, pp. 6, 10). But in many cases, in accordance with societal gender roles, men are responsible for decision making regarding land and water management (The World Bank, 2009, p. 229) and are therefore more often integrated into related associations and projects and profit from information, networks, technology distribution, and trainings, "as women were until now kept out of the projects despite cultivating significant areas of land" (Douxchamps et al., 2012, p. 18). Also from the perspective of Agricultural Innovation Systems, women should be engaged in agricultural innovations, because they are needed to raise competitiveness and to intensify smallholder agriculture, which can provide sustainable livelihoods to a larger percentage of vulnerable rural populations (The World Bank, 2009, p. 265). There is need to recognise both men and women as central actors in the provision and management of water and other natural resources. Especially regarding the provision of household food and food security, the importance of women as major players in the agricultural sector must not be overlooked.

While development actors increasingly emphasise the importance of gender equity for agricultural and rural development to ensure food security and sustainability, there still remains a gendered nature of agricultural science, as research as well as supportive extension services typically focus on male farmers' production issues and agricultural researchers themselves are oftentimes men. Therefore, women are frequently excluded from access to important resources and technical information, their needs and concerns are overlooked and furthermore, "[...] the lack of attention to gendered divisions of labor on the farm and in households may mean that efforts to increase agricultural production inadvertently expand women's workloads [...]" (Bezner Kerr, 2008, p. 291f.). On the contrary, the study of neglected areas such as food processing has the potential of reducing women's burden of work while at the same time improving livelihoods of women and children (Bezner Kerr, 2008, p. 292).

Such an increase in work load and time use for certain individuals can be identified following the introduction of several technological innovations and new farming techniques in agricultural communities. Their adoption can have context-specific gendered positive but also negative effects inside households and across households with different wealth characteristics and accesses to extension services. Furthermore, "the effects of technologies and interventions are assumed to vary among individuals in a household, depending on socio-cultural context, gender, age, religion, skills, abilities, social relations including kinship ties, and economic and social status" (Beuchelt & Badstue, 2013, p. 712). As technological innovations may affect work habits and workloads of other related agricultural tasks that are allocated to a specific gender or age group, this group may oppose technology adaptation, if they fear disadvantages. One example could be the introduction of fertilizer, which has the potential to increase agricultural production, but also to expand weeding efforts. Therefore, the adoption of fertilizer use depends on gender roles and responsibilities, on questions such as who decides over production output use, who is responsible for weeding, and who has more intra-household bargaining power. Hence, it is necessary to analyse societal structures and dynamics to predict intended and unintended impacts on time use, income possibilities, control of outputs, labour patterns, and the allocation of resources and land between men and women (Beuchelt & Badstue, 2013, p. 710f.; Bezner Kerr, 2008, p. 291f.).

Even though "[t]here is renewed interest in the agricultural sector as an engine of growth and development and greater recognition of the importance of women in

agriculture” (Alkire et al., 2012, p. 2), the links between natural resource management and the role of gender, in contrast to the many literature examples on gender in health and education sectors, do not seem to be as extensively explored (Douma, 2012, p. 9). Therefore, a better understanding and acknowledgement of the gender dimensions in the management of rainwater and other important resources in crop-livestock farming are of great significance. Especially as the empowerment of women and the improvement of gender equality contribute to higher productivity and rural development (IFAD, 2012, p. 10ff.), improved insights into gender dynamics affect the ability of development projects to design appropriate agricultural, technological, and market interventions for a sustainable improvement of the socio-economic well-being of both women and men in local crop-livestock systems.

### 3. Objectives

The main goal of the CPWF-Volta, the Volta Basin Development Challenge, is to “[s]trengthen integrated management of rainwater and small reservoirs so that they can be used equitably and for multiple purposes” (CPWF, n.d.). It is further defined as “improving rainwater and small reservoir management in Burkina Faso and Northern Ghana to contribute to poverty reduction, and improved livelihoods resilience while taking account of upstream and downstream water users including ecosystem services” (VBDC, 2011, p. 3).

More specifically, this study aims at understanding gender-differentiated systems of water uses and needs, agricultural production, access to markets, to knowledge and related resources. It analyses gender dynamics, namely non-static roles and relations, of rainwater harvesting, cultivation, livestock keeping, and marketing within specific communities by applying a gender-differentiated target group analysis to determine whether and how ongoing economic, social, and ecological changes, including effects of project activities, have modified these dynamics and impacted women’s and men’s livelihoods.

This study addresses the following research questions and sub-questions:

Q1: What are the gender dynamics in rainwater management in the Nakanbé basin?



- How are practices and innovations around rainwater management used and perceived among local women and men?
- How are roles in constructing and implementing rainwater management structures in individual or household fields distributed among women and men?

Q2: What are the gender dynamics in crop and livestock farming in the Nakanbé basin?

- How are practices and innovations around agriculture, including livestock, used and perceived among local women and men?
- How is access to land distributed differently among women and men?
- How is access to water constructed and negotiated and how do women and men use available water?
- How are responsibilities and tasks in cultivation distributed among women and men?
- How are women involved differently from men in livestock ownership, raising, and care?
- How is access to input resources and services constructed for and negotiated among women and men?
- How are women and men involved in processing and marketing agricultural produce, including livestock?

Q3: How do changes in rainwater management and agriculture affect the livelihoods of women and men in different situations?

Within the assessment of gender-differentiated agricultural activities within households and communities, underlying perceptions, decision making, and power structures, considerable attention was paid to relative dynamics and aspects of change.

## **4. Methodology**

### **4.1 Design**

To collect the relevant information to answer the research questions formulated in chapter 3, I conducted a qualitative social mixed-method research. Gender-differentiated agricultural activities, tasks, and responsibilities in relation to rainwater management strategies and around agriculture and livestock keeping were assessed, whereas special attention was paid to gender dynamics in the context of smallholder

crop-livestock agro-ecosystems. Various recent changes were determined and analysed from an ex-post perspective.

Even though, in the selection of study communities and interview partners, considerable attention was paid to village, resource, and livelihood characteristics, this study generates results that are valid at the local level and cannot be generalised for a wider population.

Triangulation was practised between reviewed secondary data for general background information, conceptualisation and methodology, and qualitative data for explorative and detailed local information, collected via several different methods. In a circular research process, data collection and analysis were conducted frequently and regularly in a rotational way, allowing for adjustments of collection methods. Constant critical self-reflection of the researcher in the field as well as critical reflection of the appropriateness of selected research methods were important elements of this process.

## **4.2 Sampling**

In a first step, after conducting introductory visits to seven research sites of the CPWF-V2 project in the Nakanbé basin, I reduced the number of research sites to four villages to allow for a more comprehensive and in-depth assessment of local livelihood contexts and situations. This selection process was guided by considerations of respective agro-ecological situations, water availability, and agricultural activities. Furthermore, the selected study communities should allow for a worthwhile comparison.

On the site, both female and male interview partners were identified among households engaged in mixed crop-livestock production in these villages. This includes participants in on-farm trials and innovation platforms of the CPWF-V2 project, as well as non-participants. Basically, this selection was subject to purposive or purposeful sampling. For this very common sampling technique in qualitative research, I selected the most productive sample to answer my research questions, considering important variables such as gender, age, primary and secondary activities, and project involvement. Local village authorities, project participants, and other local contact persons made useful recommendations and helped my research partner and me to identify focus group participants and interview partners in their village by drawing on their social networks. Therefore, elements of a snowball sampling strategy were applied, too. Similar to many

qualitative studies, this one also contains a certain element of convenience sampling, as we depended on the accessibility of possible interviewees in terms of time and location (Marshall, 1996, p. 523; Silverman, 2005, p. 129f.).

Interview partners in each village consisted of three men and three women who lived and worked in households engaged in agriculture and livestock keeping. All of them had already started families of their own and were therefore considered to have different responsibility levels compared to persons who did not need to care about their own children yet. But in relation to interview partners' age, the aim was to provide for heterogeneity and to interview persons situated in diverging life cycles at the time. Also, in each village two interviewees, one person of each gender, lived in the same household. As members of households were not considered as uniform, but as having different interests, experiences, and perceptions, information provided by separate individual interviews with a man and with a woman who lived together in the same household was expected to allow for an interesting comparison. In relation to project activities, at least one person of each gender group participated in CPWF-V2 project activities. Furthermore, also one man and one woman in each village were participants in our focus group discussions.

### **4.3 Data collection**

As already stated, qualitative data was considered essential for this specific research focus, as it is concerned with exploring people's everyday behaviour, personal experiences, and perceptions (Silverman, 2005, p. 6). While secondary data review produced relevant background information, primary data was collected by using semi-structured interview methods and other methods of *Participatory Rural Appraisal* (Chambers, 1994, p. 959f.). Because of language barriers, primary data was collected together with a local research partner, who translated questions, answers, and other comments from the local language Mòorè to French. Throughout the collection process, special attention was paid to livelihood perceptions and strategies, keeping in mind the relevance and dynamic nature of interconnected categories of capitals (CVTL, 2005, p. 37ff.; Davis, Haghebaert, & Peppiatt, 2004, pp. 6f., 12f.).

At the beginning of the data collection process, we paid preliminary visits to seven V2 study sites to gain general information about the villages' ecological, economic, and

social situations. We introduced ourselves and the planned research to community representatives and project contact persons, while also getting to know them and their village in the course of an introductory group meeting and village walks. This process allowed for clarification of open questions about us and the research by participating village inhabitants and it also allowed us to request their permission for participation in the research (Nelson & Chaudhury, 2012, p. 54), including our stay in the village and the research activities.

In the course of these introductory visits, three semi-structured interviews were conducted in each village. Interview partners consisted of one or two women and therefore two or one men, whereas two of the three participated in V2 project activities. In combination with the group meeting, these interviews provided useful preliminary information about local livelihood specifics and concerns that informed and shaped techniques and questions used in future interviews during field stays.

After acquiring these research permissions, I selected four of the seven villages for further research and arranged for research stays in the concerned villages with respective local contact persons. During the research stays at the sites, data was acquired using methods such as focus group discussions, personal interviews, and observations. During the data collection, “emphasis was put on the crucial balancing act between a too strong and a too weak focus, in order to take into consideration actual local understandings, definitions and important issues, but not to lose track of the selected research problem (Silverman, 2005, p. 91).

## **5. Research sites**

In the course of the CPWF-V2 project on *Integrated management of rainwater for crop-livestock agroecosystems*, two specific research regions with rain-fed crop-livestock smallholder systems in the Nakanbé basin in Burkina Faso were selected according to their agro-ecological gradient and market access<sup>1</sup> (Ayantunde, 2010; Douxchamps et al., 2012, p. 3). Furthermore, in the course of this research, two villages have been selected in each region particularly considering their respective water infrastructures.

Two research sites, the villages of Bogoya and Koura-Bagre, are located in the commune of Ouahigouya, which is in the northern Yatenga province of Burkina Faso,

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<sup>1</sup> Hereby market access was understood by the project as the proximity to a bigger market, namely, in the Nakanbé river basin, the marketing opportunities of the capital Ouagadougou.

sharing a border with neighbouring Mali. Because of climatic changes and decreasing rainfalls, climatic zones shift in a southerly direction. Therefore, several northern provinces like Yatenga can be considered as either still located in the Sudano-Sahelian or as already part of the Sahelian climatic zone, which experiences the lowest amounts of annual rainfall in Burkina Faso (Barry et al., 2005, p. 16f.).

The other two research sites are the village of Boussouma in the commune of Koubri, and in the village of Toeghin in the commune of Komsilga, both in the province of Kadiogo. They are located south-east and south-west of the Burkinabe capital of Ouagadougou, respectively, in the geographical area of the Central Plateau, which is characterized by a Sahelo-Sudanian climate.

Because of their agroecological zones and their regional annual rainfall patterns, which range from around 300 to 600 mm or 500 to 900 mm, and therefore favour mixed crop-livestock or predominantly crop farming, respectively, lengths of growing seasons, agricultural activities and livelihoods differ in these two regions (Lemoalle & de Condappa, 2010, p. 658f.).

Concerning the research sites' social conditions, all villages have been observed to lie in the area populated mainly by members of the Mossi ethnic group, whereas small and geographically separated communities of immigrated Bobo and Fulani people have been noted. Inhabitants of the northern research villages are predominantly Muslim, while a slight majority of inhabitants of central Burkinabe villages are Christian. Nevertheless, all research villages own both Muslim and Christian places of worship (Field notes 2013).

Regarding local infrastructures, only Koura-Bagre and Boussouma have improved paved roads that connect them to the next bigger towns, respectively to Ouahigouya and Koubri (Field notes 2013; FG men Bous.). While primary schools are present in all villages, alphabetisation centres are in Bogoya, Koura-Bagre and Boussouma. A Koran school as well as facilities for formal secondary education only exist in Bogoya, the comparatively largest village (Field notes 2013; FGs). A rural health centre also only exists in Bogoya (FG men Bog.; FG women Bog.), whereas access to health services was noted to be especially problematic in Boussouma, as the village is isolated due to flooded roads during certain month of the rainy season (FG men Bous.).

Similarly, market access is also subject to considerable local differences. While both central Burkinabe villages are indeed much closer to the Ouagadougou's profitable markets than the two northern ones, as assumed by the V2 project, local market

availability is also important. In this respect, Boussouma and Toeghin have small permanent markets (open on every third day) in the village, whereas Koura-Bagre has a seasonal market but also selling opportunities on the side of a well-frequented road (connecting Ouagadougou with Ouahigouya). Bogoya doesn't have a permanent intra-village market place at all, although it is the largest researched village (Field notes 2013; FGs).

Further detailed information on livelihood characteristics in the four villages is provided in the following presentation of research results.

## **6. Results**

The research results, presented in this chapter, are structured according to the research questions formulated in chapter 3. Therefore, the first sub-chapter addresses gender-differentiated uses and perceptions of rainwater management practices and innovations, as well as gendered roles in constructing the respective techniques. The subsequent sub-chapter on gender dynamics in local crop and livestock farming presents research findings in relation to land and water access, practices and innovations in water use, cultivation, livestock keeping, processing and marketing, as well as access to input resources and services. Additionally, some space was provided to present important issues that arose during the data collection process but are not directly associated with a particular research question.

### **6.1 Dynamics of rainwater management – practices & innovations**

Rainwater is considered as most essential for small-scale crop-livestock systems in the Burkinabe Nakanbé basin, as production of cereals that are used for daily nutrition is undertaken in the rainy season and therefore only irrigated by rainfall. Thus rainfall patterns are commonly perceived as crucial for harvests and livelihood sustainment, but their variability has been mentioned by all interview partners and focus group participants as problematic. In this chapter, local perceptions of rainwater variability and scarcity and the subsequent importance of rainwater management (RWM) techniques are presented. Furthermore research outcomes in relation to gender-

differentiated and locally specific perceptions of RWM practices and innovations, their use and application characteristics are discussed.

Rainy seasons in the northern research villages of Bogoya and Koura-Bagre generally only last for about three months, peaking around August and September (Interviews: woman A, K.B.; woman Z, Bog.). The central Burkinabe research villages of Boussouma and Toeghin generally receive little more rain than the northern ones, but in all research sites rain is perceived as highly variable and insufficient. Declining rainfall was observed primarily during the last ten years (FG men K.B.; Interviews: man L, K.B.; man I, Bous.; woman C, T.). Particularly the time of a year's first rains are noticed to delay significantly (FG men Bous.; Interview: woman L, Bog.; amongst others) and also the lengths of local rainy seasons are considered as shorter as they were before. Even though these problematic issues are important parts of a general perception about rainfall, the fact that rainfalls are increasingly variable, with phases of too much and too little rain in between one season and also across several years, has been noted by women and men of different age groups alike. The following quote exemplifies these observations:

“La pluviométrie a vraiment baissé ces derniers années. Parce-que avant, jusqu'à Décembre il pleuvait. Et les récoltes aussi, il y avait à ce quoi manger, parce-que il pleuvait. Mais maintenant, il n'y a plus assez de pluie. [...] Ca dépend, c'est la répartition en fait de pluie. Et de moment, il commence à pleuvoir tard. Deuxièmement, quand il pleut, il y a des périodes où il pleut abondamment lorsque la plante n'a pas besoin d'assez d'eau à ce moment. Et après en moment où la plante a besoin d'assez d'eau, il ne pleut pas assez. Et puis aussi, la durée aussi, il ne pleut pas durannement. Ce varie” (FG women Bous.).

Another problematic aspect of variable rainfall patterns are dry-spells that mostly occur at the beginning of the rainy season, during the first 30 to 40 days (Interview: woman A, K.B.), which is a crucial time in plants' live cycle as the seeds were just sown and are in need of enough water to develop. When such a period of several dry days occurs, one interviewee mentioned periods of ten to twenty days (Interview: woman C, T.), there is a high probability that most or even all of the plants “die”. As a result one needs to restart the cultivation process, to buy additional seeds and to re-sow them. While this demands a relatively high amount of money that puts strain on personal financial means, which are very limited anyway, it also means that the time left of the rainy season is short, which further increases the probability of another failed growing process. An elderly man in Toeghin describes this problematic issue by comparing the current situation to the one he experienced as a young man, about 60 years ago:

“Aussi, avant, quand tu sème, à l’intervalle de 3 jours on sème. Ca veut dire que, avant, à notre temps, quand l’hivernage commence, en 14 jours on a fini de semer. Tout ce qui reste c’est le désherbage. Mais aujourd’hui, quand tu sèmes, on attend peut-être plus de 20 jours porque il pleut encore, et on sème. Et souvent, à l’intervalle de 20 jours les semences sont mort, il faut recommencer encore. Mais c’est ne pas la même chose comme avant. Et aussi, dans notre temps, quand nous étions plus jeunes, quand tu cultivais le maïs par exemple, à l’intervalle de 0 à 150 jours, le maïs est déjà dans les granières. Mais [...] aujourd’hui la pluviométrie n’est pas ça, il ne pleut pas assez. Donc, souvent même si on a un cycle court [variété de semence], ça ne donne pas” (Interview: man S, T.).

Besides this problematic variability of rainfall during one crop production season, changing rainfall patterns across several seasons are also crucial. Even a good year in terms of rainfall doesn’t necessarily translate to good harvests and local food security. A man in Bogoya explained this fact with people’s fear of losing their seeds and financial means, which they need to invest in their agricultural production despite facing uncertain rainfall patterns for the coming season. Especially after experiencing rain scarcity in the preceding year, farmers tend to be more careful and reluctant to invest extensively in crop production:

“Peut-être l’an passé, la saison de 2011, [...] il n’a pas assez plu, les gens ont produit, ils n’ont rien presque. Mais à cause de ça, les gens ont eu peur l’an passé, ils ont peut-être fait les petits petits espaces. Ils n’ont pas voulu produit beaucoup, porque si ils sèment beaucoup et qu’il ne pleut pas aussi, ça va peut-être mal-donner. Donc mais pourtant l’an passé la pluie nous a surpris. [...] autour de 1 au 8 Juin comme ça j’ai déjà fini de semer. Donc la pluie avait bien. Mais cette année, jusqu’au présent, il ne pleut pas. Donc, nous sommes là, nous attendons la pluie” (Interview: man M, Bog.).

Another reason for bad harvest outcomes even though there would have been a lot of rain, is that not all kinds of soil and not all types of crops require the same amount of water. As millet, the crop mainly used for nutrition in the research villages, doesn’t need a lot of water, “donc, comme l’an passé [2012] il a assez plu, l’eau a gâté la production de certains, et pour certains c’était une bonne saison” (Interview: woman L, Bog.).

As has been described, not-anticipated variability and lack of rainfall severely affect crop production, but they also determine all other local production processes. One major issue are sinking yields in crop production. Especially too much or too little rain, and dry spells, as already mentioned, cause problems in crop farming (Interview: man E, Bous.) and thus harmfully impact household food security. But at the same time availability of fodder for animals is also negatively affected, as haulms are collected from the crop fields at harvest times and are stored and dried at home to feed small ruminants and cattle during certain dry months when no leaves or grass can be found anymore in the surrounding environment. Another aspect to this agriculture-livestock



interdependence is that if crop harvests are not sufficient for a family's nutrition or for other livelihood needs, animals are sold to receive cash and be able to buy food and possibly other necessary items. But even though there are animals in a household to sell, they usually cannot replace the food otherwise grown in own crop fields:

“Par rapport à l'Elevage, [...] toute est lié à l'Agriculture. Si il pleut pas assez, nous pouvons arriver même que on a assez des têtes [des animaux] et on vende tout. Mais ça ne va pas suffir pour alimenter la famille” (FG men Bog.).

Furthermore, because of rain deficits, water levels in dammed water reservoirs (FG men Bog.; Interview: man E, Bous.) and in wells are not as high as in earlier years and sink especially crucial at the end of the dry season with serious effects on local water availability for household use and vegetable production.

“Mais maintenant au niveau du barrage, la productivité n'est plus comme avant. Au début ça produisait beaucoup, mais maintenant il n'y a plus assez d'eau, ça ne produit pas assez actuellement. La production a vraiment baissé. Avant nous pouvions travailler et au moins acheter un vélo” (FG women Bous.).

As yields of crop fields and gardens are crucially important for local livelihoods, the effective management of existing rainwater by applying specific techniques is perceived as having various positive effects, and as necessary to gain food from one's fields at all in the current context of scarce rain. They represent opportunities to counteract general environmental degradation and to deal with uncertain rainfalls, as “par rapport à la moisson aussi, il y a la pluie mais il y a [aussi] la connaissance de nos jours” (Interview: man O, Bog.; comment by a.).

RWM techniques are perceived by farmers as helping them to gain more from a smaller field (Interview: man M, Bog.), to moisten the field's soil and also to stop rainwater flows from pouring over the field, which would harm plants and wash away nutrients and fertilizer. Additionally, especially the technique of *zaï*, is claimed to protect the seeds from dry-spells for up to two weeks (Interview: man O, Bog.).

“Ces, qui ont mis des *zaï* par exemple, bien avant, si la pluie est tard, peut-être la semence qu'ils ont mis dans le trou est mort. Donc, il faut encore aller prendre. Pourtant normalement quand on fait les *zaï*, jusqu'à une semaine, si il pleut, ça pousse et puis ça continue en même temps” (Interview: man M, Bog.).

The most commonly used technique in both northern and central Burkinabe research sites are stone bunds, cordons pierreux. They can be constructed on all kinds of fields, sandy or not (Interview: woman Z, Bog.), but are mostly used on old fields (Interview: woman A, K.B.) and/or on dry areas that demand this technique to improve the soil's ability to infiltrate rainwater (Interview: woman C, T.). Generally they are perceived to

help against erosion and for maintaining water necessary for plants' development inside the field (Interview: woman E, Bous.). Whereas they can be constructed as surrounding a field, others build several in rows inside a field, also using them as water barriers (Interviews: woman A, T.; C, T.).

Despite their wide-spread application, stone bunds must still be considered as a rather new innovation in agriculture, whereas considerable differences in the duration of their application have been observed between regions and villages. One explanation for this can be that the need to implement RWM strategies arose at different times in the respective study villages. For example, a man in Toeghin noted that at the times of his parents, there was no problem of water scarcity in his village, but since about twenty years he needs to construct stone bunds in his fields to try to maintain existing rainwater for his crop production:

“[...] avant même aux temps de nos parentes, quand il ne pleut pas pendant deux ou trois jours, les gens avaient des cultes, des rituelles à faire pour demander la pluie. Peut-être tuer un chèvre ou bien un bœuf et les femmes préparent le dolo [= local sorghum beer]. Ils font la cérémonie pour demander la pluie, et le même jour, il pleuvait. Donc, le problème d'eau ne se posait pas, ils avaient des solutions. Mais aujourd'hui il ne pleut pas assez, donc dans les champs, ce que nous pouvons faire pour maintenir l'eau de pluie, c'est essayer de faire les cordons pierreux. [...] Depuis ils ont commencé à faire ça, jusqu'à maintenant, ça vaut 20 ans” (Interview: man S, T.).

According to interview partners, farmers in Toeghin appeared to know about stone bunds for the longest time, compared to the other three research villages. One woman, a 55-year old, already uses them since about 1987, when they were first introduced in Toeghin by the organisation AVLP (Association Vivre les Paysans) (Interview: woman S, T.).

In the other central Burkinabe village Boussouma this technique was promoted in the course of a training workshop by P.D.R.D.P. (Projet de Développement Rural Décentralisé et Participatif, run by the African Development Bank and funded by the African Development Fund) for some few selected local farmers. While this was claimed to have happened only at least seven years ago (FG men Bous.), women participating in the focus group mentioned to use and know about stone bunds for a long time already (FG women Bous.).

In the northern villages, a woman in Bogoya reported that before six years ago, not everybody knew about stone bunds (Interview: woman S, Bog.) and some women in Koura-Bagre started to apply this technique about ten years ago, as it was promoted in

their village by *Agents techniques de l'Agriculture* (FG women K.B.). A man in the same village noted, that he received informations about stone bunds in the course of a training workshop by FNGN (Fédération National des Groupements Naam), where

“[...] ils ont essayé d'associer beaucoup des producteurs sur un espace comme un demi-hectare. [...] c'est pour essayer de nous apprendre comment il faut produire à partir des espaces secs, et à travers des cordons pierreux. Donc on même temps comment on faire les cordons pierreux, comment on maintenir l'eau dans ces espaces secs, où on peut toujours exploiter. [...] Donc, c'est sur cet espace, que beaucoup des gens ont appris de technique pour aller maintenant et reproduire sur leur propre champ” (Interview: man L, K.B.).

Additionally, the technique has also been further distributed and reinforced in all the study villages by INERA (Institut National de l'Environnement et des Recherches Agricoles) in the course of the CPWF-V2 project in the year 2013. For the respective workshops they selected some few persons in each village to implement them. A woman in Koura-Bagre mentioned, that before these workshops, in which her husband participated, took place, she didn't use stone bunds at all (Interview: woman F, K.B.). In contrast, another woman in Koura-Bagre claimed to have worked with stone bunds in her village of origin well before moving here at the time of her marriage, about 25 years ago (Interview: woman A, K.B.).

But even though there are considerable advantages when applying stone bunds in or around a field, there are still also negative aspects to this technique, as their construction needs to be renewed after about four years. This is because rainwater that needs to be kept inside the bunds, in the field, doesn't enter the field anymore but rather surrounds the crop field.

“Souvent quand on fait les cordons pierreux dans un certain espace, la première année, les premiers deux, trois ans, ça peut aller. Mais à un certain moment, on a l'impression que l'eau qu'on veut barrer, le champ est en hauteur et l'eau ne rente plus, ça ça contour le champ pour partir. Ça c'est un des inconvénients aussi des cordons pierreux” (Interview: man A, Bog.).

In addition to or instead of stone bunds, certain herbs like *Kopoko* or trees like *Obalanga* (Interview: man J, T.) are also frequently used around fields to fight against soil erosion. One man in Boussouma uses them for about twenty years (Interview: man I, Bous.) and some women in Boussouma note that they know this technique for a very long time already even though not everybody applies it (FG women Bous.). Sometimes these herbs are sown around the stone bunds and certain trees are left in and around the fields because they are perceived as protecting the field and its crops from fast and thus

destructive rainwater flows and as helping to store enough rainwater inside the fields (Interviews: man A, Bog.; woman Z, Bog.; man J, T.).

Depending on the respective field's size and soil characteristics, inside these stone bunds farmers said to either plough the field, as it reverses the soil and thus allows for improved rainwater infiltration (Interview: man L, K.B.), or to construct *zai*.

“Que par exemple l'espace comme le bas-fond, on ne peut pas faire les *zai* là-bas, parce-que c'est déjà suffisamment [moite]. Il faut rentrer avec la charrue et puis travailler. Maintenant les espaces un peu sèche, c'est où on fait les *zai* ” (Interview: woman A, K.B.).

Generally, *zai* are used for old, degraded and dry fields that haven't been used in the past years because they are not that favourable for agricultural production. But when someone is in need of a new crop field, he or she constructs stone bunds and *zai* to re-fertilize and re-moisture the soil to be able to cultivate it in the following year (Interviews: man A, Bog.; woman A, K.B.).

Next to fields in *bas-fonds*, mentioned in the last quote, sandy fields in general are also not suitable for the construction of *zai*:

“Même si tu fais les trous des *zai* et que il y a le vent, ça peut fermer tous les trous après. Donc elle dit que, les *zai* marchent avec les terrains durs, [...] les terrains un peu en hauteur. Ce n'est pas les terrains en bas attitude, avec beaucoup de sable, ça ne marche pas” (Interview: woman Z, Bog.).

Whereas the construction of *zai* first of all depends on the type of soil, it also doesn't work with all kinds of crops. For groundnuts or red sorghum *zai* are not used because especially the latter crop doesn't support a very humid and fertile soil (Interview: woman F, K.B.). But in fields of millet or of millet intercropped with beans and of white sorghum *zai* are constructed with considerable positive outcomes (Interviews: man O, Bog.; man S, K.B.). But even in these fields they are not necessarily implemented in every season, because their construction requires physical as well as financial means, as one needs to have enough dung or compost to fill the *zai*-holes with (Interview: man A, Bog.).

In the northern Yatenga province *zai* are commonly known and used for a long time already. For example in Bogoya one man mentioned that he uses them on his fields inside stone bunds for about 30 years. He got to know the technique with an elder brother, who was the first in the village to construct them:

“Par rapport aux *zai* [...] c'est près d'un grand frère qui était au village ici. C'est ce grand frère qui était le premier à travailler les *zai* ici. Donc, c'est de ce grand frère, que les gens ont vu comment on fait les *zai* ” (Interview: man O, Bog.).

In Koura-Bagre a 56-year old woman mentioned to know and use the *zai* since she started to work in Agriculture (Interview: woman F, K.B.) and, similarly, male focus group participants even claimed to know them from their parents' generation already: "Les *zai* anciens, nous sommes nés trouver ça, avec nos parentes. Maintenant les *zai* améliorés, c'est ce qui a amené beaucoup plus de changements dans la production. Et aujourd'hui nous connaissons ça, il y a six ans" (FG men K.B.). These men in Koura-Bagre were the only ones in the four research sites to mention the improved *zai* technique at all. They received informations about their construction and use in the course of training workshops by local *Agents techniques de l'Agriculture* about six years ago (FG men K.B.).

In both central Burkinabe villages, *zai* have neither been mentioned as an adopted RWM technique nor has their implementation or use been observed in the fields in and around the villages. The same applies to the technique of *Demie-Lunes* or half-moons that are also constructed in fields for millet production (Interview: woman F, K.B.). They are generally not as commonly known as the other two techniques, as in Bogoya for example one woman reported not to know half-moons at all (Interview: woman L, Bog.), while both men and women in Koura-Bagre mentioned that they know half-moons for about ten years now (FG women K.B.). In contrast to women, man received informations about the technique from training workshops by *Agents techniques de l'Agriculture* (FG men K.B.). A younger man in Koura-Bagre, just in his 20s, has been implicated in another training workshop, in the course of which he also got to know half-moons, but this took place only five years ago by an organisation called P.R.D. (Projet pôles régionaux de développement) (Interview: man R, K.B.). At about the same time, but without any training incorporation, an elderly woman in Koura-Bagre also noted to have gotten to know half-moons (Interview: woman F, K.B.).

Generally, men tend to have more and earlier information about RWM techniques and were much more frequently included in trainings and workshop activities than women. Whereas all women and men mentioned the crucial importance of RWM for their harvest outcomes regarding the challenging current environmental situation, determined by variable rainfall patterns and dry to degraded soils, different techniques are preferred and applied in the different villages as well as by different households and furthermore

in different households' fields<sup>2</sup>. In the following, the question on gender-differentiated roles in constructing and implementing the described RWM structures will be addressed.

According to a normative view on societal roles in relation to RWM construction, that has been mentioned in some individual interviews in all research sites, but increasingly so in the northern villages, men are considered to be responsible for the construction of RWM techniques, partly because they have received more detailed informations on RWM implementation. But generally, all household members capable of working in fields take part in the construction in one way or another. For example, interviews and observations showed that women are frequently responsible for collecting and transporting stones from the "brousse" to the household's fields for the construction of stone bunds:

“[P]our les cordons pierreux, c’est les hommes qui vont faire ça. Et ils font ça ensemble. Maintenant, si l’homme ne veut pas faire ça, il doit venir nous montrer comment ils font. Mais généralement, c’est un travail que tout le monde fait ensemble. [...] Donc maintenant, si il y un travail qu’il ne peut pas faire, parce qu’il est malade ou quelque chose, en tout cas, on peut l’aider, ou bien il montre comment on fait, puis on va le faire. C’est pas comme si c’est interdit [pour les femmes de faire]. Mais généralement, c’est un travail qui est fait par les hommes. Les zaï, les cordons pierreux [...]. Nous ramassons les pierres, nous donne aux hommes aller. C’est les hommes qui construisent mais nous, nous sommes là-bas pour l’aider avec les pierres, ramasser les pierres lui donner. Donc nous l’aidons dans ce sens pour qu’ils fassent les cordons pierreux. Nous, nous ne savons pas comment on construit” (Interview: woman L, Bog.).

For constructing stone bunds in women's private fields, a woman in Toeghin reported that she constructed them herself together with her children (Interview: woman A, T.), while another one in Bogoya said that she knows how to construct them herself but did so together with her husband (Interview: woman Z, Bog.). Additionally, the construction of stone bunds also depends on project involvements that help organising stone transports (Interview: man H, T.), as a woman in Boussouma mentioned that her husband and his parents constructed stone bunds in the course of a project in her field (Interview: woman L, Bous.).

Whereas stone bunds are generally perceived as necessary and suitable for all kinds of fields and are thus frequently constructed in men's as well as women's fields, *zaï* are not.

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<sup>2</sup> The differentiations between larger collective fields and small private fields, particularly for women, that are both part of a household's land possessions, are discussed in more detail in the following chapter on land access.

“[P]ar rapport aux *zai*, mon mari, ce sont les hommes qui creusent, qui font les trous. Et maintenant, après ça, les femmes sèment, les femmes les aident dans tout. [...] Donc comme nous, les femmes, nous travaillons d’abord avec les hommes dans les champs collectifs, s’il faut encore faire les *zai* sur son [propre] espace, c’est trop de travail. Et encore, il faut s’occuper de la nourriture à la maison” (Interview: woman L, Bog.).

While this woman in Bogoya mentioned, that she doesn’t construct *zai* in her own field because it would be too much work load for her and because it is usually a man’s job, she also stressed that it’s not forbidden for women to dig and implement them. But generally *zai* are constructed in larger fields that usually belong to men who inherited them by their parents, and not in smaller fields like the women’s ones (Interview: woman L, Bog.). Similarly, a man in Koura-Bagre mentioned that *zai* are implemented primarily in the large collective field, whereas women’s smaller private fields are only ploughed (Interview: man L, K.B.). Even though this application characteristic can be seen as a kind of norm followed in the past years, as land scarcity is increasingly experienced, *zai* and also half-moons are now also used in smaller fields to increase harvest outcomes (Interview: woman A, K.B.).

While RWM construction specifics aren’t only determined by soils’, crops’ or gender differentials, a person’s age also plays a significant role in his or hers involvement in RWM implementation processes. Elder women and men, from about 50 years onwards, most often do not have the strength anymore to dig *zai* or half-moons, and are thus supported by their children and other younger persons who live with them and who can do this physically tedious work for them (Interviews: woman S, Bog.; man L, K.B.; man S, K.B.; woman F, K.B.). In relation to this support by one’s children, there is also a gender dimension worth noting. A man mentioned that *zai* are dug more by young men than by women, even though in his household there are two young women who are not yet married and who also contribute significantly to the construction of *zai* in his fields (Field notes 2013, K.B.; Interview: man L, K.B.), “[m]ais généralement c’est les garçons” (Interview: man L, K.B.).

Thus there appeared to be a strong gendered perception of activities contributing to RWM construction, most probably being significantly determined by the primarily male involvement in workshop activities aiming at distributing information and offering training for increased adoption of RWM techniques in rural crop fields. But still, most interview partners emphasized that all members of a household can and need to take part in the construction of RWM techniques. Especially regarding the implementation

of stone bunds, all family members work together (Interviews: man J, T.; man S, T.; woman C, T.):

“Pour le faire, nous nous réunissons, d’autres ramassent les pierres, d’autres transportent les pierres sur la tête, d’autres le font par la charrette. Et nous nous réunissons. Ça veut dire que, on peut aller faire ça dans le champ d’un tonton et aujourd’hui on part faire dans le champ d’un autre ” (Interview: man S, T.).

**In conclusion**, both men and women regarded RWM techniques as positive measures that help them to increase harvest outcomes of their fields, which become increasingly smaller with every new generation. The fact that fields are frequently characterized by a nutrient-poor, often dry soil that results from their long exploitation across several generations, adds to RWM techniques’ importance. While there are considerable differences across various households, stone bunds are commonly constructed in all four research villages. They are considered as agricultural innovations and were mostly promoted by various projects and organizations between the respective periods of the past five to ten years, in both northern villages and in Boussouma, and between the last 20 to 30 years in Toeghin. Projects or organizations from outside the village as well as community-intern groups, such as a women’s group in Koura-Bagre, organize to help with the construction of stone bunds, mostly by finding, collecting and transporting the stones or small rocks. Still, seemingly all members of a household, who are available and can work, are implicated in the construction of stone bunds. This was especially noted in both central Burkinabe villages.

In contrast, *zai* and half-moons are only implemented in the villages of the northern Yatenga province, which is considered as the “birth place” of this endogenous Burkinabe technique. As their construction demands physical strength, it is generally younger people who dig them in larger collective household fields. Reasons for the fact that they are primarily implemented in the big common crop field, but often not in women’s individual fields, include considerations of respective soil characteristics as well as the perception, that these individual fields are too small to apply such RWM structures.

According to expressed societal norms, digging the holes for *zai* and for half-moons is considered as a male-dominated activity, even though personal interviews with women and personal observations of field tasks show that also a lot of women work with the hoe or the local agricultural tool *daba* to construct these RWM techniques.





Figure 4: A woman digs *zai* in a field “en brousse” close to Koura-Bagre (Source: photo by author).

Similarly to the construction of stone bunds, all other tasks associated with the implementation of *zai* and half-moons, like the transport and distribution of dung or compost and the sowing of millet or sorghum seeds, are conducted jointly by all members of a household. Especially children were reported to be a great source of support, particularly for older and for over-burdened farmers.



Figure 5: Distribution of compost to be filled in already constructed *zai* and half-moons in a household's collective field in Koura-Bagre at the beginning of the rainy season (Source: photo by author).

Generally, women tended to know about RWM practices for less long than men did, while women received knowledge from their own family and also from their new post-marriage family and village. Specific obstacles faced by individuals for the construction of RWM techniques are strength and time constraints on the one hand, and financial and physical means especially needed for *zai* and half-moons on the other. The latter includes the possession of enough dung or compost, resulting from possessing either enough animals or enough money to buy it. While these obstacles are experienced by both, women and men, women with young children and few or no animals were observed to constitute the most severely affected group.

This study understands RWM in a broader sense, incorporating the herein discussed stone bunds, *zai*, half-moons and other soil protection measures, but also the management and use of important water sources, as their respective water levels and utilisation opportunities crucially depend on rainfall patterns. Gender-differentiated access to and use of various locally available water resources will be discussed separately in the following chapter 6.2.2.

Next to RWM techniques, there are also other related measures that help to sustain and improve harvest outcomes. Most prominently, these include fertilizing the soil by applying dung, compost or chemical fertilizer, and also using specific new seed varieties adapted for a short-lasting rainy season. These contributions to local abilities of coping more effectively with environmental difficulties were already briefly mentioned in this chapter and will be addressed more specifically in the following ones, particularly in chapter 6.2.5.

## **6.2 Dynamics of crop & livestock farming – practices & innovations**

As has been shown in the previous chapter, rainwater management in crop-livestock systems cannot be considered independently from other essential social, economic and environmental factors that influence and determine local livelihoods. Perceptions on and implementation of innovations as well as specific local construction practices of RWM techniques are inherently linked to accessible land and its respective soil quality, to

water access and to agricultural tasks, which are in turn determined by access characteristics to input and output resources and services as well as, and most importantly, by gender-specific social norms.

Details on general and gender-specific practices and related innovations in crop and livestock farming are presented in the following sub-chapters.

### **6.2.1 Land access**

Availability of and access opportunities to land are constructed very differently among the four research sites, as they are dependent on the respective environmental situation of the village. To answer the question on gender-differentiated land access, one needs to differentiate between land resources for different uses. Land is primarily used for crop production in the actual agricultural season, the rainy season, which spans from about June to September. Besides that, land is also used for animal pasture, and additionally, land next to a suitable water resource can be used for gardening, for producing vegetables for sale. This is a rather new activity that is increasingly promoted across the country.

Generally, land distribution in all four villages is subject to customary inheritance rights, whereupon a family's land is distributed among the family's sons. All interview respondents confirmed the prevalence of male land ownership, whereas formal land titles were reported to be rare if not non-existent. The bureaucratic process of acquiring formal land titles with the local administrative unit, the *Mairie*, was known by some male village inhabitants, but it was perceived as a complicated, long and expensive procedure and mostly as not necessary, as land ownership by families is commonly known and respected among the various village populations.

Acquiring land is therefore subject to patrilineal inheritance practices, with women receiving land from their husbands, but also possibly from their fathers. The latter is possible for women who are not yet married or who are married to a man within their village of origin. In this case they are still *enfants du village*, currently living in their home-village, and therefore user rights to land for food production are negotiable with members of their patrilineal lineage. Common land access and the resulting dependence of women on men in this respect were explicated by a female interview partner in Bogoya: "Ces champs appartiennent aux hommes et pas aux femmes. Donc nous, les

femmes, nous associons toujours aux hommes pour travailler” (Interview: woman L, Bog.).

A problematic aspect that affects land access is the increasingly perceived lack of land for agricultural use:

“Par rapport à la situation agricole, ce-que je vois aujourd'hui, c'est très différent de ce qui était d'actualité au moment où j'étais plus jeune. D'abord il y avait de l'espace, il y avait assez d'arbres. Donc, quand on veut vraiment cultiver ou veut peut-être abattre les arbres pour faire un nouveau champ, et la terre était fertile là-bas. Quand on partait cultiver là-bas, le rendement était bon” (Interview: man S, T.).

This issue was stressed by all interview partners in the northern villages of Bogoya and Koura-Bagre as well as in one central Burkinabe village, Toeghin. An exception is Boussouma, where only half of all interview partners, women as well as men of different age groups and household backgrounds, perceived land shortage. Even though the use and exploitation of existing fields by multiple generations and the expansive occupation of space by a growing population and their fields can be understood as a widespread problem that already diminishes livelihood security of the current generation and that will most likely be exacerbated for the next one, this issue is subject to regional and local differences. Land pressure is experienced by different villages and families at varying levels. One woman in Koura-Bagre mentioned that village fields are limited and that space for cultivation is sought farer from the village and closer to other surrounding villages that don't yet experience such a lack of land. Furthermore she said that she was still used to cultivate large fields in her home-village, unlike in her husband's village where families need to live off smaller fields (Interview: woman A, K.B.). Even though some years ago smaller fields have not been cultivated by using RWM techniques such as *zai* and half-moons, this is now increasingly necessary to improve harvest outcomes. Also, fertilization has been mentioned by women and men of all villages to be of pressing relevance to re-fertilize the old and depleted soil and to boost production.

Land deficit affects crop production as well as livestock keeping. Limited pasture land is observed and problematized in all four villages but especially in the north, where keeping of less animals is mentioned as a resulting change (Interview: woman A, K.B.). Nowadays cattle, which is used for agricultural labour with a plough during the rainy season, is more often temporarily left with herders of Fulani communities living close by, who are specialized in cattle keeping. They take care of the cattle during the dry season, as they own land specifically dedicated to pasture. This practice is particularly

common in the northern villages, in Koura-Bagre for example it is considered necessary as there isn't enough land for pasture available since about ten years (Interview: man L, K.B.).

Another effect of limited land is the diversification of activities that are used and needed to build and sustain people's livelihoods. As agriculture lost its role as a sole provider of food and other livelihood needs, it is increasingly complemented with livestock keeping and gardening that serve as important income sources (Interview: man M, Bog.). Furthermore food production for sale at local and regional markets is increasing significantly, as opposed to subsistence agriculture, which was more common among the former generation.

Next to population growth, formal purchase of land by people outside of a village represents a new factor exacerbating land pressure. This occurs in central Burkinabe villages that are relatively close to the growing capital city Ouagadougou. An elderly male interviewee in Boussouma observed dynamics related to the emergence of rich agro-business men, who buy land at the local district capital Koubri, about 15 kilometres far from his village:

“Avant c'était plus facile d'avoir accès à la terre ici pour cultiver. Mais ces dernières années c'est devenue difficile parce-que, par exemple ces de Koubri quittent là-bas, à cause des riches, des Agro-business men. Les gens de Koubri ont vendu leur terre et ils sont obligés maintenant de quitter Koubri pour venir travailler ici. Donc, ça fait que il n'y a plus assez d'espace aujourd'hui pour quelqu'un qui veut venir s'installer pour cultiver. C'est difficile d'avoir accès maintenant à la terre. [...] En fait c'est les riches qui occupent les grandes espaces, ils viennent payer les grandes espaces. Donc, les gens ont vendu leurs espaces. [...] Ces les riches d'Ouagadougou qui viennent occuper, payer les espaces” (Interview: man I, T.).

The formal purchase of locally owned crop or garden land by non-village members for commercial use is emerging in the area around Ouagadougou and has considerably negative effects on local land availability and access. While cash income is crucial and frequently needed, land is still necessary for agricultural production and seeking new fields elsewhere increases local land pressure.

These dynamics and trends that result in local land deficits, do not only negatively affect land availability in general, but also land access, particularly for women. For example, one woman in Toeghin explicates, that access to land is especially difficult for her and for other women,

“[...] parce-que les hommes même trouve que l'espace ne les suffit pas. Donc, et nous sont les femmes qui sont venu d'ailleurs, nous ne sommes pas d'ici. Donc à cause de ça, c'est difficile d'avoir des grands espaces et faire des grandes choses.

Nous produisons sur des petites espaces. Donc à cause de ça, je transforme un peu un peu à côté pour aussi me débrouiller. Si non, l'accès de terre est difficile“ (Interview: woman C, T.).

As she said, families' bigger fields usually, according to all local verbal informations and observations, belong to male household heads, as they inherited them from their parents. Women, on the contrary, most of the time grow up in different villages and move to their husbands' village in the course of their marriage. Therefore they cannot claim any permanent land ownership rights in their new village and need to rely on and cope with limited land resources given to them by their husbands. To make a living with these limited resources, processing and selling of agricultural products to generate higher surplus by adding value to goods is considered as very important, especially for women.

Besides land, male household heads also own their fields' harvest outcomes. The harvest, produced by all household members who are physically able to cultivate, is commonly used for alimentation of all household members. But control and decision making over the harvest's use, be it for food preparation within the household or for selling to earn money at the market, is part of the household head's responsibility. Even when harvest is used for the family's nutritious sustainment, it is most often not sufficient for consumption during the dry and rainy seasons until the next harvest time. The fact that subsistence production is not possible anymore for most households is related to population growth. This contributed to the splitting of households' fields, which are divided into a larger common field and several smaller individual fields assigned to particular household members, notably wives and elder sons. This change is described by a woman in Koura-Bagre in the following quote:

“Maintenant comme de nos jours les gens sont devenus nombreux c'est pourquoi on fait en sorte que chaque femme ait un champ à partir de lequel elle peut aussi récolter pour faire ses besoins et ses enfants. Donc maintenant c'est chaque enfant qui travaille avec sa mère dans son champ” (Interview: woman F, K.B.).

Therefore, nowadays wives have their own small individual fields which they cultivate with their own children's help. If there are more co-wives in the same household, as is often the case among Muslim families, each wife is given her own field or fields by her husband. She cultivates these fields together with her respective children and other people, mostly young relatives, who are living with her and of whom she takes care of. These fields' harvests can be sold, and also processed before selling, to cater for personal needs as well as those of the people the respective woman takes care of. But

still, usually this personal harvest is also required to contribute to the families' food provision.

Another trend that takes place at about the same time, in the last five to 20 years with considerable regional variation (earlier in central than in northern Burkinabe villages), is a change in social organisation. Formally land was owned exclusively by the oldest male household head. His family members lived and worked together in larger groups including parents, sons and their respective families. But nowadays land ownership is increasingly possible for married sons and their young families that constitute new separate economic and social entities. In contrast to those larger *concessions* or *cours* in the past, grown-up sons now have access to their own land, which they can cultivate independently well before their fathers' or grandfathers' deaths (FG women Bog.; Interviews: woman Z, Bog.; man L, K.B.; amongst others). In some households, especially in the southern research villages, even household members who are not yet grown-ups, mostly sons from the age of 15 onwards (Interview: man J, T.), can receive small individual fields within the household's land resources that they cultivate independently to care for themselves, to "essayer de produire pour s'occuper de ses propres besoins" (Interview: man S, T.).

While land is usually received from the household head and land owner, as has already been discussed, in case of land shortage it is also possible and not uncommon to borrow land from a non-family member who either lives in the same or in a neighbouring village. Interviews and focus group discussions showed that this practice of borrowing land temporarily for food production is particularly common among married women. While it has been stressed by various men and women during the research process that there is no money involved in temporary land provision, voluntary gifts for the land owner are still appreciated, though not required. A woman in Koura-Bagre noted that, if the harvest was good and even selling of surplus is possible, one can donate a plate filled with harvest products such as millet or sorghum or groundnuts, and some sugar for a morning coffee. This would facilitate access to his land in the next season (Interview: woman F, K.B.).

As lack of rain and fertile land result in the problematic fact that crop farming in the rainy season alone is usually not sufficient to provide for food and other livelihood needs for the rapidly growing population, access to other income sources is increasingly important.

“Donc, ça fait que ce qu’on gagne dans l’agriculture même ne suffit plus pour manger. [...] Même s’il pleut souvent ce qu’on gagne, en tout cas, ce n’est pas comme avant, que ça suffisait. Parce-que les espaces se sont devenues petites avec le nombre de la population” (Interview: woman L, Bog.).

Therefore, access to land for gardening purposes is crucial, as was expressed by male focus group participants in Bogoya:

“Aujourd’hui le jardinage procure d’autre sources des revenus pour des gens. [...] Ca c’est parce-que aujourd’hui souvent dans l’Agriculture hivernal, on ne trouve pas souvent des bonnes récoltes. Si bien qu’on a obligé d’associer à ça, en tout cas, le Jardinage peut s’emporter. [...] Maintenant le Jardinage c’est une dérogation qui produire de l’argent pour des gens” (FG men Bog.).

The existence of water reservoirs, dams (*barrage*) or other water resources such as a low-lying area that stores rainwater (*bas-fond*) or an open well with enough water of considerable quality enable the use of the surrounding land as gardens during the dry season. These garden parcels, especially located around artificially constructed water reservoirs, can be either subject to family lineage ownership or they are constructed and distributed among village inhabitants in the course of a development cooperation project.

Two research sites, the villages of Bogoya and Boussouma, have water reservoirs that were constructed by building a dam. In Bogoya, land around its *barrage* belongs to the inhabitants of one certain village neighbourhood, the *Cartier* Kanbengo, as this area is a part of their fields. Therefore, it’s the men and women of Kanbengo’s families, who primarily cultivate the fields around the *barrage*. But if someone else wants to produce vegetables there, he or she needs to rent the fields from them for 5,000 FCFA (franc de la Communauté Financière d’Afrique) per year. In addition to the necessary financial input, garden plots around the *barrage* are limited and thus access is difficult. This is the case especially for women who, most of the time, have less financial means than men (Interview: woman L, Bog.), which is reflected in the fact that there are more men than women working in these gardens (FG women Bog.). Next to vegetable production in the dry season, there is also rice cultivation during the rainy season located at the edge of the *barrage*. The rice fields have been constructed and initially ploughed through by an unknown project in the year 2012. They were distributed among men as well as women, while acknowledging former field owners (Interview: woman L, Bog.). In relation to the effects of local access to gardens, male focus group participants mentioned the back-migration and subsequent village population growth after the



construction of the barrage more than 40 years ago, as access to gardens was perceived positively as access to needed additional income sources:

“Le barrage existe plus de 40 ans. Avant ça il n'y avait pas le Jardinage, c'est après ça. Il y a d'autres même qui sont-, quand ils quittent en Côte d'Ivoire, ils sont venus trouver de barrage, qu'ils peuvent travailler, ils ne sont plus repartis” (FG men Bog.).

In the second village that owns large surface water resources, Boussouma, there are three *barrages*, whereas one of them is not useable anymore due to misconstruction. Even though they have been built much earlier, gardening practices are known and practiced among the village population since about 15 years, owing to information and training by FNGN (FG men Bous.). Therefore, garden access is mainly constructed via membership in women's or men's associations, who cooperated with FNGN (Interviews: woman E, Bous.; man I, Bous.; woman L, Bous.). Members of the village's women's association helped with collecting sand for the dam's construction and were therefore included in the distribution of gardening plots, which were reserved partly for men, partly for women. This opportunity for additional food and income generation attracted even more women to join the association (FG women Bous.). Gardening is subsequently practiced in cooperation and with support by the respective association, but also possibly together by husband and wife, as known from a young catholic household in Boussouma (Interview: woman E, Bous.). Nevertheless, some women, regardless of their personal garden access, mentioned that there is not enough space for gardening and that population growth is one of the reasons for the difficult access to new gardens (Interviews: woman A, Bous.; woman L, Bous.).

In Toeghin, gardens are limited because of local water constraints. There is no permanent water surface, but there is a *bas-fond* close to the village with some few gardens, and recently also rice fields that can both be cultivated exclusively during the rainy season. Additionally, some inhabitants of Bogoya also cultivate gardens during the dry season at a *barrage* in the nearby village Kalzi, partly drawing on family relations and on memberships in gardening associations for land access (Interview: man H, T.; man J, T.). Somehow this practice has only been observed among men. While access to the gardens at the *bas-fond* also appeared to be easier and more common for men (Interviews: man H, T.; man J, T.; woman A, T.), rice cultivation plots were set up and distributed among village households by the project “riz pluvial”, an outcome of the development cooperation between Burkina Faso and Taiwan. The allocation of rice fields followed the pattern of one parcel for a household with a husband and one wife

and two parcels for a polygynous household in which one is dedicated to the man and the other one to his wives (Interview: woman S, T.).

While gardening in the dry off-season is generally more common around water reservoirs, it is also possible in an area surrounding open wells that are deep enough not to dry up during the critical month of March to May. This is done in Koura-Bagre. Here land also belongs to certain private village inhabitants, who use the land as plots for their cereal production in the rainy season, and who give away their land, divided into parcels of equal size, to women living in the village who want to produce vegetables in the dry season. Access to garden land in Koura-Bagre is therefore subject to distribution according to direct demand, whereas there are no requirements of payment for this temporary land leasing. The involvement of financial payment was strictly denied but the villagers admitted, that one can offer a part of the harvest to the landowner's family as a sign of thankfulness. This practice results in a win-win-situation for both, for the land leasing female gardeners, because they have the opportunity to produce vegetables, to sell them and to receive extra income, and for the land owning crop farmers, because their land does not lie fallow during the hot and dry season, but is cultivated, irrigated and fertilized, leaving it in a favourable condition for the ensuing crop production season (Field notes 2013, K.B.).

Similarly to these gardens in Koura-Bagre, a man in Bogoya mentioned, that he used to cultivate vegetables in his field, by digging a well himself and irrigating by hand: “[I]l n'y a même pas les moto pompes. Donc je creusais un puits dans mon champ et c'est à partir du puits au jardin. Et c'est dans ce puits que je puiser remplier les arrosoirs et j'arrosais avec la main” (Interview: man O, Bog.).

As gardening generally produces higher revenues than crop production, there are also persons who use their field, if it is sloping, located on a hill for example, to produce vegetables during the rainy season (FG men Bog; FG women Bog.).

**In conclusion**, access to crop land and partly also to land suitable for gardening, is subject to patrilineal inheritance rights, whereas men's inherited land is increasingly diminishing because of population growth and degraded by agricultural exploitation over several generations. Women usually receive crop land through their husbands, and gardens either through their husbands or by membership in a women's group or association. Additionally it is common practice, especially for women, to borrow both types of land for one or more growing seasons from a non-family member who is able

to give away one of his crop fields during the rainy season or a garden parcel during the dry season. Land access is not financially restricted as far as informal lending of land within a village community and also in interaction with neighbouring villages is concerned. But access to limited land around water resources, specifically dedicated to gardening or rice production, is restricted by lineage ownership or project-related land distribution patterns, and thus has to be paid for by persons not included in these access structures.

Women are also, if not more intensely affected by population pressure, as their land access possibilities also diminish along with a growing land deficit, while they are particularly responsible for family care, food provision and food preparation. The change in social organisation with more populous *cours* separating into smaller households that live, cultivate and consume largely independently from one another, effected women's access to land and their related production responsibilities. Still, in contrast to the importance of women's land cultivation, a young woman who moved to her husband's village some years ago said that she cannot say anything about the situation of land access in her new village, because as a woman she is not integrated into the local discussion and decision making regarding land at all (Interview: woman A, Bous.).

### **6.2.2 Water access and use**

Access to water resources depends on several factors, while actual availability determined by seasonal variation, access rights and ownership regulations, as well as competition over these scarce but essential resources have been found to be of significant importance in all four research villages.

The research sites show considerably different ecological conditions in relation to their respective water infrastructure. Water resources considered in this study include various water surface areas such a *barrage* or a *bas-fond*, and wells, whereas their availability is locally diverse and always determined by seasonality of and change in rainfall patterns. This chapter gives an overview of available water resources in the respective villages and related problems caused by rainfall characteristics as well as other external and internal influencing factors. Local perceptions of these issues and their dynamics are furthermore complemented by insights into local gender-differentiated water access and use characteristics.

Large and usually permanent water surface areas, where water is stored by the construction of a dam, a *barrage*, exist in Bogoya and in Boussouma. In Bogoya one *barrage* has already been constructed over 40 years ago and in Boussouma three *barrages* have been built intermittently during the last 30 years. While water levels in Bogoya's *barrage* are perceived as sufficient, inhabitants of Boussouma noted that one *barrage* sometimes runs dry (Interview: man I, Bous.), an issue that has devastating effects on the use of this *barrage* for irrigating gardens and for watering animals.

In Toeghin there is a *bas-fond* called *Morigo*, which holds changing levels of water mainly during the rainy and early dry season, but dries up during several month in the dry season. Therefore, the surrounding fields can only be used for water-intensive activities such as gardens and rice fields during the rainy season (Field notes 2013, T.).

A third kind of water resource, open wells, exists in all villages and is primarily used for washing clothes and also for irrigating gardens. Irrigating with water from a well by using watering cans is practiced particularly widespread in Koura-Bagre, as already described in the above chapter on land access. Besides that only two such incidents have been found. One in the other northern village, Bogoya, where a man irrigated his garden by using a self-built well (Interview: man O, Bog.), also mentioned in the previous chapter, and another one in Toeghin, where water from a privately owned well is pumped up with a motor pump to irrigate the surrounding private garden (Field notes 2013, T.). But still, water access for irrigation was commonly perceived as difficult. For example one woman in Bogoya noted that on the one hand there is not enough land available for garden purposes around suitable water sources and on the other hand there are not enough water resources in appropriate distance that would allow her to irrigate gardens around her compound (Interview: woman Z, Bog.).

Irrigation of gardens during the dry season is mostly undertaken with the help of private or collectively owned motor pumps at the *barrages*, but at open wells it is watering cans that are primarily used to produce vegetables for sale. During the field research, the only noted exception to this is the aforementioned open well with a motor pump on the garden area of a man in Toeghin, who is comparatively better-off in terms of land and animal possessions as well as family size.



Figure 6: Open well with a motor pump in a private garden in Toeghin (Source: photo by author).

Generally, gender-differentiated water use for gardening purposes is constructed very differently among the four research sites. In Bogoya and Boussouma, where there are specific, mostly permanent water surface areas, men and women can have access to land and water to produce vegetables. Especially around Boussouma's *barrages* women are active in gardening as they, as long as being member in the local women's group, have their own garden parcels specifically reserved for them. But in Bogoya's dry season's as well as in Toeghin's rainy season's gardening activities there are mostly men implicated and subsequently profiting from vegetable sales. This differentiation can be understood as related to scarce local land and water resources as well as to household intern distribution of farming and other livelihood activities. But another important influencing factor concerning the use of Bogoya's *barrage* is that one has to pay for a gardening parcel if the land does not belong to one-self, and generally, according to information by most interviews, men have more financial and physical means, as they are the households' heads and control the large collective field including its outcomes.

In contrast to these gender-differentiated constructions of water access, rice production along Toeghin's *bas-fond* is practiced by men as well as women, as the respective parcels have been constructed and distributed by a development cooperation project, already described in the last chapter. Even though a husband and his wife received a parcel together and in polygynous households a husband and his wives received either

one plot, actual irrigation and cultivation activities are still subject to intra-household decision making.

Yet differently, water access to irrigate gardens around Koura-Bagre's open wells is exclusively acquired by women while men take care of animals during the dry season. While these wells are constructed for common use, the surrounding land belongs to men and is temporarily borrowed from them by women to produce onions (Field notes 2013, K.B.). These women's gardening networks in Koura-Bagre are supported by organisations, one of them being *Burkina Vert*, a non-profit Non-Governmental Organisation (NGO) (Burkina Vert, 2011). These organizations help to increase water access by improving the construction of existing wells that are described as being not deep enough and therefore as sometimes drying up during certain very dry months (FG men K.B.). But future support remains unclear, even though the women presented their current problem to *Burkina Vert* of not having a well big and deep enough for unproblematic gardening:

“C'est Burkina Vert qui nous a donné le grillage. Et c'est Burkina Vert qui nous soutient pour le maraîchage. Et l'an passé ils sont venus nous donner. La saison passée nous avons travaillé, ils ont dit que c'est bon. Donc ils vont revenir ajouter le grillage. Et aussi nous avons posé le problème, que nous n'avons pas assez d'eau et si nous pouvions avoir un bon puits. Et ils ont même dit, que si nous, les femmes là, pouvions aussi contribuer, peut-être payer les semences et ils vont nous aider à creuser un grand puits à grande géométrie pour cimenter et là il va avoir assez d'eau pour le travail. Mais ils ne sont pas encore venus” (Interview: woman A, K.B.).

In addition to these water uses for food production, *barrages* are also used for livestock care, more specifically for watering and washing animals. In Bogoya watering animals poses no problem as water in the *barrage* is continuously available, but one has to be careful during the rainy season because there has already been an incident that fast rising water levels surprised and carried away some animals. Another difficulty in relation to water access for watering animals in Bogoya is, that in times of intense vegetable production around the *barrage* there is only one path available for animals and their herders to reach to the *barrage* (Interview: man A, Bog.). In Boussouma access to water for animals is perceived as more problematic due to seasonal lack of water in one of their *barrages*, whereas the lowest water levels usually occur at the end of the dry season where access to water is specifically crucial anyway (Interviews: man I, Bous.; woman A, Bous.).

Another way to water animals has been described by male focus group participants in Toeghin, where excess water of pumped wells is now useable for this purpose because

of an innovative well construction that includes a retention basin, built by livestock keepers from the village themselves (FG men T.).

“Avant même les pompes qui sont là, on ne considérait pas. [...] Là où les animaux pouvaient passer. Mais maintenant, comme toutes l'eau pompé n'est pas forcément utilisé les eaux de rejet sont un peu canalisé vers un peu baquet là. C'est accessible aux animaux pour aller boire là-bas. Les pompes, bonnes fontaines comme ça. Ça aussi c'est une innovation [...]. C'est construit par les Eleveurs [du village même], qui veulent utiliser la pompe avec les usages” (FG men T.).

As water is essential for general life sustainment and health, it is needed on a regular basis for drinking, cooking, washing, body hygiene and cleaning. Whereas water of open wells is used by women for washing clothes and also by some local *dolotières* for the preparation of sorghum beer, the *dolo* (FG women T.), water for household consumption, for drinking, cooking and hygiene, is generally drawn from closed wells that are operated with hand pumps, wheels or pedals. Usually access to these closed wells is free as most of them are collectively owned. But some wells are dedicated primarily to the inhabitants of a certain village *quartier* and others are restricted for certain institutions like schools. School wells are sometimes even closed at night or during holidays, prohibiting their private use by neighbouring compounds (Field notes 2013).

Searching, collecting and transporting water for domestic use is a responsibility of women in the research villages. Women receive support from their children, who help to bring fresh water to the compound even before leaving for school in the morning (Interviews: woman Z, Bog.; woman F, K.B.). Every day either one or both of them walk or drive with their bikes or, rarely, with motorbikes, to the closest functioning well, pump water into canisters and carry them home. Those who go by foot carry their canisters either on their heads or, if their household owns a cart, use this as it facilitates the task by reducing workload and energy input (Field notes 2013, K.B., T.).



Figure 7: Cart specifically but not exclusively used to transport water canisters (Source: photo by author).

Generally, in individual interviews it has been predominantly women who talked about the issues and problems of searching for water. In Bogoya, one major issue that has been mentioned by participants in the women's focus group as well as by individual female interviewees is that their village's water tower doesn't work anymore and so do also several pumped wells throughout the village. Even though the different *quartiers* of Bogoya collected around 100,000 FCFA for the specific purpose of quickly repairing broken wells, this has not been undertaken yet because representative decision makers in the *quartiers* that are not directly affected have refused to contribute to the reparation until now. This results in a very difficult water access situation for the whole village as availability of drinking water is crucially scarce, only remaining in three single sites, one of those being the school's well (FG women Bog.). Therefore women need to walk or drive farer and earlier to be able to fetch water from those overcrowded and overused sites for their own and their families' water needs. This difficult situation is described by a woman who lives in the *quartier* with a functioning well, in the following quote.

“[...] parce-que les pompes sont gâtées un peu, le problème de l'eau était dangereux et cruciale à Bogoya ici. Si bien que vers où là où vous [research partner and me] habitez [AJBFB meeting compound], que généralement les gens quittent là-bas pour venir vers ici pour chercher l'eau. Ca fait que c'est très difficile. Et c'est pourquoi moi souvent, je m'élève très tôt pour aller chercher l'eau. Parce-que si je laisse, au même moment que les autres viennent, souvent ils peuvent se frapper là-bas, pour l'eau. Parce-que chacun veut l'eau. C'est comme un point d'eau pour beaucoup des



personnes. Normalement c'est la source d'eau pour ce quartier. Mais il y a d'autres qui viennent parce-que là-bas ils n'ont pas d'eau" (Interview: woman Z, Bog.).

Water access in Koura-Bagre depends on the respective location of the household's compound, as one interviewee said that "par rapport à l'accès à l'eau, je n'ai pas des problèmes, je suis juste à côté du puits. L'eau est permanent là" (Interview: woman A, K.B.), while another mentioned, that "pour avoir de l'eau, il faut aller jusqu'au vers la mosquée pour aller chercher l'eau pour boire. Il n'en a pas à côté de nos maisons. C'est ça vraiment qui nous nerves" (Interview: woman F, K.B.). In the whole village, there are only two pumped wells for common use and one additional for the local school's water needs (FG women K.B.).



Figure 8: A closed, foot pedal pumped well for drinking water on the outskirts of Koura-Bagre (Source: photo by author).

In Boussouma, in turn, participants of men's focus group noted that there is "un nombre assez grand des forages dans le village" (FG men Bous.). This fact is also reflected in both women's and men's village maps that showed the existence of eight pumped wells in Boussouma.

In Toeghin, men mentioned five pumped wells in their focus group's village map, whereas women only noted the existence of four such closed wells but also of two additional ones that currently do not work. Furthermore both men and women remarked that one pumped well is not generally accessible because it belongs to the local school, and another one is not accessible during certain month in and shortly after the rainy

season as water creates a barrier that prohibits reaching the well (FG men T.; FG women T.). Another problematic aspect of water access in Toeghin is the available water's quality, which results in the fact that one pumped and one open well are not useable (FG women T.).

Notably, the availability of water in all sources is always determined by rainfall patterns. Therefore, rainfall, being observed as variable and increasingly scarce by farmers in all research villages, as already described in chapter 5.1, poses significant, mostly seasonal problems for access to water for productive as well as household uses.

**In conclusion**, the collection and transportation of water for domestic use is considered to be a woman's responsibility in all research sites, whereas children are fundamentally implicated in related tasks. Changes in access to drinking water are induced by seasonality of rainfall as well as by seasonal or permanent non-functioning of wells. Repairing of broken pumps usually lies in the responsibility sphere of communities, namely whole villages and frequently also village *quartiers*. The respective decision makers are observed to be usually men, even though, due to women's societal gender roles as water providers, it is mostly women and children who are affected by broken and non-functioning wells in terms of increased energy and time inputs.

In relation to water access for productive use, ownership regulations play important roles, as land around water sources such as *barrages*, *bas-fonds*, but also wells, is subject to private ownership through male inheritance rights. If the respective land is owned by a family, user rights are negotiated among the family members, whereas men, being perceived as household heads, tend to take ultimate decisions. If the respective land is not owned by one's own family, payment requirements are common for scarce garden land surrounding *barrages* or *bas-fonds*. But however, no payment habits have been observed for borrowing privately owned land around wells. A yet different way of constructing access to water resources for productive use is practiced by organizations and projects that set up rice or vegetable production parcels. They tend to distribute these parcels more or less equally among village inhabitants, privileging both male and female contributors to the respective construction, whereas they have been noted to consider former field ownership structures.

### **6.2.3 Working in fields and gardens**

Agricultural activities in fields and gardens are conducted by men, women and children to contribute to their household's alimentation and earn money to pay for other specific needs, which include health care, education, clothing and additional food. As has already been described, there are common fields that are cultivated collectively, and private fields cultivated by individual household members. Similarly, gardens can also be cultivated together with other household members, but appeared to be used most often individually. These differentiations result in the fact that responsibilities and tasks in cultivation, with which this chapter is concerned, are subject to field-specific variation, while gender dimensions play an important role in the distribution of daily and seasonal agricultural tasks. Additionally, agricultural responsibilities and activities are household-specific as they are negotiated household-internally and are determined by various household characteristics such as the number and age of its members, the household's wealth situation as well as the respective land possessions and land access opportunities.

In relation to daily routines in agricultural labour during the rainy season, interview partners in all research villages reported similar courses of actions. Generally, all household members who are available and physically capable of farming work together in the common field from morning to noon. After some rest and lunch from about noon to 2 p.m. women and other young household members who have their own individual fields continue to work there until returning home in the evening. While men tend to leave earlier in the morning for the common field, women take care of the household's water provision, food production and other household tasks before joining the male and other, mostly younger household members in the collective field. However, there are considerable household-specific differences in relation to agricultural labour before noon, as not all women in a household prepare food on a daily basis. It has been noted that in polygynous and in multi-generational households, food preparation for all household members is often organized in a wheel, with women taking turns and therefore staying at home for longer because of cooking responsibilities only every few days. While elderly women were said to be included in this work as well, they are sometimes excluded from agricultural tasks in the household's common field because of age-related strength deficits (Interviews: man J, T.; man S, T.). In this case, they can head directly to their individual fields to cultivate over there.

In general, important food crops such as millet, sorghum and, increasingly, corn, are cultivated extensively in the common field. While these are frequently also grown in individual fields to provide for the family's consumption needs, cash crops such as groundnuts, sesame or beans, and others such as peas, Bambara groundnuts, hibiscus and sorrel are particularly often farmed in personal fields. Crops specifically grown by women include "les petites petites cultures" (Interview: woman A, K.B.), namely groundnuts, hibiscus, sorrel and beans, and also sesame (Interviews: man M, Bog.; woman L, Bog.). While women frequently dedicate specific fields to these crops, they are also cultivated by men but generally in a smaller quantity and just inside their millet field. "Mais, le cultivate des hommes ne touche pas lequel des femmes, c'est carrément féminin" (Interview: woman A, K.B.). This applies particularly to groundnuts that are easily and profitably sold at local markets. The so generated revenues allow women to pay their children's school fees (Interviews: woman L, Bog.; woman S, Bog.; woman A, T.).

"C'est les femmes mêmes qui font l'arachide. Comme il y a l'argent dans l'arachide, souvent même tu peux venir trouver que il n'y a pas d'arachide parce-que elles ont tous vendu. Donc, c'est les femmes qui vendent et qui produisent l'arachide" (Interview: man M, Bog.).

In gardening, there are also gendered crops. Especially okra is considered as a female crop (Interview: woman A, K.B.), but also cabbage, sorrel and green beans are more often produced by women than by men (Interview: man O, Bog.). Besides that both men and women cultivate tomatoes, onions, aubergines and pepper (Field notes 2013, Bog., K.B., T.; Interviews: man M, Bog.; man O, Bog.).

In the following, general as well as gender-differentiated agricultural activities are discussed, following the chronological order presented by focus group participants in their seasonal calendars, while regional and village specific differences are accounted for.

At the beginning of the farming season, before and during the first rains, only men reported to be engaged in repairing agricultural tools (Field notes 2013, Bous.; FG men K.B.; Interview: man R, K.B.). At the same time, in May, men in Koura-Bagre noted to plant small trees in a specific tree nursery, which they replant in and around their fields for fertilization purposes and against soil erosion in August (FG men K.B.).

The preparation of a crop field includes tasks such as cutting down small trees and bushes and initially ploughing the field or constructing RWM strategies. This takes

place from about February to May, depending on the respective local start of the rainy season, which was already described to be very variable from year to year.

Clearing the field from small trees and bushes with a machete takes place between March and May. In the northern research sites, the exclusively male character of this tedious work was stressed by several male and female interview partners (Interviews: woman L, Bog.; woman Z, Bog.; man S, K.B.; amongst others) and explanations included, that when

“[...] il peut y avoir des serpents, et puis ça demande de la force physique. Donc ça aussi ça dépend, si tout un champ qui doit être coupé par- et où la femme doit vraiment couper les herbes c’est un peu difficile pour la femme, c’est un travail pénible. [...] Et pour même couper les herbes, pour protéger la femme contre des petits reptiles, les serpents ou bien les scorpions qui peuvent la piquer. Et nous pouvons faire plus attention que la femme” (Interview: man L, K.B.).

However, in the central Burkinabe research sites, focus group participants mentioned that women and children also frequently help with this task (FG women Bous.; FG women T.). And additionally, women in Toeghin mentioned that they engage in burning their fields in March, an activity that also aims at clearing the fields from various plants (FG women T.).

For the initial ploughing of the field with ploughs drawn by cattle or, more recently also by donkeys (Interviews: man O, Bog.; man L, K.B.; man S, T.), it is exclusively men in northern, and both in the central villages. The work with a plough therefore showed one of the most notable differences between research sites in the two geographically different areas. While in Boussouma and Toeghin women and men of various age groups alike were said and observed to be involved in ploughing, in Bogoya and Koura-Bagre both emphasised that it is only men who conduct this task, who hold and guide the plough, while young men or boys walk before and beside the plough to guide and drive the ox or the donkey pulling the plough. The main explanation cited by men for this strict gender-differentiation was related to strength, as “la charrue est lourde, ça a du poids, donc des fois il faut soulever la charrue pour éviter quelques choses. Si la femme n’a pas la force, c’est difficile” (Interview: man L, K.B.).

Even if the household head or other male grown-up household members are not available at the time of the first rains, the most suitable period for ploughing the field, a woman in Koura-Bagre reported that her husband, who didn’t own a plough at that time, sold a cattle and distributed the money among his wives so that they can pay someone to come and plough their fields for them (Interview: woman F, K.B.).

In central Burkinabe research sites, where working with the plough isn't uncommon for a woman at all, gender-differentiated working patterns in relation to ploughing are still present. A woman in Boussouma noted that on the one hand everybody can work with a plough, but on the other children and women usually walk behind the plough to sow (Interview: woman L, Bous.) and another in Toeghin reported that she knows how to use it and that she actually works with the plough when her husband isn't around. But if he is, he prefers to do so (Interview: woman C, T.).



Figure 9: A man and his sons plough the field at the beginning of the rainy season in Koura-Bagre, while some women work with a hoe in another field behind (Source: photo by author).

If a household has enough money to borrow a tractor, which is usually available in the next bigger town like the district capital, men pay someone to come and plough the field for them: “[...] si c’était comme il a plu et que j’ai de moyen, il y a des fois à cette période-là, mon grand frère et moi-même nous nous associons louer un tracteur qui vient labourer tous les champs et puis nous semons” (Interview: man A, Bog.).

As already noted, some fields, according to respective soil and plant characteristics, are ploughed, while others require increased fertilization by certain RWM structures. These are also constructed in the course of other field preparation activities from about March to May, depending on the time and quantity of the year's first rains (FG men Bog.; FG men K.B.; FG women K.B.). Stone bunds were noted to be constructed primarily in March and April, earlier than *zai* or half-moons (FG women K.B.; FG men Bous.).

Additionally, stone bunds require a longer preparation time, which was reported by men in Boussouma to span from December to February (FG men Bous.). Another technique of RWM, the utilisation of herbs against erosion and for increased soil humidity, was mentioned in men's seasonal calendar in Koura-Bagre, as already cited above, and also by men and women in Boussouma, who plant these herbs in July and August, parallel to weeding tasks (FG men Bous.; FG women Bous.).

While activities in relation to the implementation of RWM strategies show certain gender- and also age-differentiated work patterns, as has already been discussed in chapter 6.1, most of the other following tasks in the fields are more frequently considered as common responsibilities with all household members participating. Everybody is required to participate in agricultural labour as all household members rely on and profit from the crop fields' harvest and because human work force is crucially needed for the household's sustainment. "Quand il s'agit de désherbages, de mettre l'engrais, de mettre le fumier et quand il s'agit des récoltes, c'est toute la famille qui participe" (Interview: woman L, Bog.).

But somehow contrary to this, a man in the northern social context has explicated the view that, if it would be possible, he would prefer his wife to concentrate on household tasks but not to also cultivate herself:

"Si j'ai le moyen même, je ne veuille pas que la femme travail sur le champ. Elle puisse vraiment donner nous à manger seulement, mais pas travailler ça propre production. Mais comme ça ne va pas donner, il faut se soutenir sur le champ pour avoir de quoi manger" (Interview: man O, Bog.).

Directly after and frequently also at the same time as the initial field preparation, the soil is fertilized and the crops are sown. In this respect some farmers noted an important change in their agricultural activities which is related to the increased use of the plough. Nowadays ploughing and sowing can be done at the same time, as one person, usually a man, handles the plough and another, commonly a woman, follows behind while directly sowing. As these two tasks were conducted temporarily separate in former times, this change is considered positively as time saving.

"[...] de nos jours, il y a un changement, parce-que avant, les gens labourent, on finit de labourer avant de commencer à semer. Aujourd'hui, en même temps quand on labour, les femmes peuvent être derrière en train de semer. Donc, ça fait gagner en temps. [...] Donc maintenant, les femmes sèment en même temps que les hommes labourent. C'est ça qui peut être la différence que les femmes sèment et les hommes labourent. Si non, ils peuvent faire le même travail mais pas pour labourer avec des ânes [ou bien avec des bœufs]" (Interview: man O, Bog.; comment by a.).



Sowing is generally done after ploughing around June (FG men Bog.; FG women Bog.; FG men K.B.; women K.B.; FG women Bous.), or at some time during May and July as it depends on the actual start of the rainy season (FG men Bous.; FG men T.; FG women T.). While this applies at least to the most commonly used crops such as millet or sorghum, other plants are sown later. For example groundnuts (FG men K.B.), sesame, beans and corn have been mentioned to be sown in July (FG women T.).

As also broached in the above quote, especially in sowing, but also in fertilizing the field, women are not exclusively, but most prominently implied (Field notes 2013, K.B.; Interviews: woman L, Bog.; woman Z, Bog.; man L, K.B.; amongst others).



Figure 10: Women sowing millet inside zai holes in their household's common field in Koura-Bagre (Source: photo by author).

Fertilization of the field appeared to be conducted at two different times. The first application of compost or dung usually takes place in April, May or June, before it rains and before the crops are sown (FG men Bog.; FG women Bog.; FG men Bous.; FG men T.), and the first application of chemical fertilizer was described to happen after the first rains and the sowing, in June (FGs men & women K.B.). The choice to apply one's animals' dung, compost or chemical fertilizer, or a combination of those, depends on the respective financial means and on the number of animal possessed by a household. Generally, the pressing need to fertilize the soil, and even the importance of chemical fertilizer was oftentimes stressed. But in many cases interview partners and focus group



participants reported that chemical fertilizer strains their financial capacities and organic fertilizer is mostly not sufficient for all of the household's fields. In this respect, women in Koura-Bagre noted that dung is primarily applied on the common field, as there is not enough quantity available to also use it on individual fields. Furthermore, they stated that fertilizer is not easily accessible to women (FG women K.B.).

A second fertilization of the crops is said to support the plants development in the last growing stage, as it would be conducted in August when the plants are already grown to a considerable height. This only concerns chemical fertilizer and is only done if there are enough financial means available (FG men T.). In relation to chemical fertilizer, male focus group participants generally seemed to be better informed about and more concerned with the specific varieties than women were (FG men K.B.). Nevertheless, while it was frequently stressed that all household members can apply organic as well as chemical fertilizer (Interviews: woman L, Bog.; man L, K.B.; man S, T.; amongst others), women and particularly children are probably even more implied in this work than men are, especially when fertilizing a field with organic matter in the course of RWM implementations, but also when applying chemical fertilizer (Interviews: man L, K.B.; woman A, K.B.; amongst others). "Donc, ça veut dire que, l'amendement là, c'est ne pas forcément les hommes qui faisaient ça pour nous. Moi aussi, je sais comment de faire ça" (Interview: woman Z, Bog.).

Regarding the provision of organic fertilizer, there are specific gender-differentiated tasks, as manure from animals is mostly collected by household heads, who are usually male, but the preparation of compost during the dry season, including its composition and regular watering, is mostly conducted by women, who are supported by their children (FG women Bog.; Interviews: woman F, K.B.; man S, T.). Concerning the respective fosses for the compost, their construction was observed to be undertaken exclusively by men and often in connection with a supporting project or workshop (Field notes 2013, K.B.; FG men Bous.; Interview: woman A, T.; amongst others).

In relation to compost, but also generally, men were noted to be much more frequently implied in training and information incentives. This was also mentioned by women in Boussouma, who noted that, while men in their village already knew about the construction and use of compost, women hadn't received any information or been included in workshops until some ten years ago, when the *Service de l'Agriculture* specifically turned towards selected members of a women's group and taught them how to produce and work with compost (FG women Bous.).

After sowing crop seeds in a fertilized field and the plants sprout, regular weeding is required throughout the plants' growing process until the harvest. The first weeding sequence was noted to start approximately two weeks after sowing, which is either in June or July (FG men K.B.; FG women K.B.), and a second one, which is considered as a particularly intense activity by both men and women, takes place in July and/or August (FG men Bog.; FG women Bog.; FG men K.B.; FG women K.B.). Differences between northern and central Burkinabe research sites include the duration of weeding and the respective tools commonly used. Focus group participants in Boussouma and Toeghin mostly noted to weed until September, which can be explained by different and frequently longer lasting rainfall in these more southern villages. While weeding in the northern villages was reported to be most commonly done by using the *daba*, but sometimes also with a smaller plough pulled by a donkey (Interview: man L, K.B.), in both southern villages, farmers specifically differentiated between the first weeding sequence, conducted with a *daba* and considered as very intense (FGs men & women Bous.), and the second one, done with a plough pulled by an animal (FG men Bous.; FG women Bous.; FG men T.). Reasons for this commonness of weeding with the plough particularly in the central Burkinabe research villages include that ploughs are in general more frequently used there and that half-moons, for which ploughs cannot be easily used, are not implemented, as in contrast to the northern villages.

While everybody is implied in these crucial weeding tasks in the common field, in many cases it is particularly women, who are usually considerably younger than their husbands, and their older children, who conduct this work (Interviews: woman Z, Bog.; man L, K.B.; man S, K.B.; man S, T; amongst others).

“Par rapport à labour, les hommes désherbent, les femmes désherbent. Maintenant, beaucoup des hommes n'aiment pas désherber, ils préfèrent que les femmes désherbent. Ils partent, les aider à semer et puis ils coupent [les tiges au moment de la récolte], pour laisser les herbes avec les femmes” (Interview: woman Z, Bog.; comment by a.).

Contrary to these common agricultural tasks in which women are extensively implicated, the application of pesticides has been emphasised to be exclusively conducted by men in all research sites. Commonly, pesticides are applied in August on pure beans fields, but recently also on corn fields (FG men Bog.; FG men K.B.; FG men T.; Interview: woman A, K.B.; amongst others). Only in rare exceptions, such as an illness without proper (male) replacement but with time pressure, women would apply pesticides:

“Pour traiter le benga [Móorè pour haricot, comment by a.] par exemple, pomper le benga, ça ces sont les hommes. [...] comme c’est l’homme qui est le chef du ménage, c’est l’homme qui fait ça. [...] si c’est pas parce que l’homme est malade ou bien il a quelque chose, il peut pas faire les travaux, que les femmes peuvent peut-être faire ça pour que la production ne se gâte pas. Sinon, tout ce qui est lié vraiment à pomper la production, c’est les hommes qui font ça” (Interview: woman L, Bog.).

While the exclusive responsibility of men for applying pesticides was also noted by many other interview partners across all research sites, one man drew the connection to protection aims but also to information and training access, as it seems that only men have been included in respective workshops and learned about appropriate dosages and protection measures in pesticides application:

“C’est pas la force forcément, il dit que c’est aussi pour se protéger, si la femme est enceinte par exemple, c’est pas bon de toucher aux pesticides [...] elle ne maîtrise pas les dosages, elle ne sait pas comment bien se protéger comme les hommes. C’est les hommes qu’on forme d’habitude, parce qu’il faut marcher pendant longtemps dans les champs. Et y a des choses que l’homme peut faire attention, auquel l’homme peut faire plus attention que la femme. Donc c’est pour ça que pour les traitements, les hommes choisissent de faire ça. C’est pas que la femme ne peut pas être initiée mais il faut en tout cas se protéger pour vraiment bien faire le travail et savoir le dosage qu’il faut mettre à chaque fois. Donc à cause de ça le traitement c’est nous qui choisissons et nous faisons ça” (Interview: man L, K.B.).

Finally, when the rains decrease and the plants reached maturity, the grains are harvested and transported to the compound where they are stored in specific cereal storages that are exclusively constructed and woven by men (Field notes 2013; Interview: man S, T.).

Similarly to sowing, in harvesting there are also temporary differences between various crops. All focus groups’ seasonal calendars showed that beans are harvested first, already in August or September. Furthermore corn, groundnuts and Bambara groundnuts were reported to be harvested well before others including millet, sorghum, sorrel and sesame. Generally, harvest in all four research villages takes place from around August to November.

“Lorsque le millet est prêt et quand on veut venir couper, récolter le millet. Ça aussi, on récolte avec les machettes. C’est les hommes qui font ça. Parce-que c’est pénible. [...] Même si on finit de couper le millet, on laisse au champ. C’est encore les hommes, qui ramassent le millet pour charger dans les charrettes et amener à la maison, mettent dans les grainiers. [...] Quand les millets arrivent à la maison, c’est aussi [les hommes] qui mettent ça dans les grainiers” (Interview: woman Z, Bog.).

While men start by cutting the haulms with a machete and leave them in the field, women’s tasks include collecting millet or sorghum themselves. After that men join

women to collect and tie up the remaining haulms (Interviews: woman Z, Bog.; man L, K.B.; man S, T.).

But regarding beans, and also Bambara groundnuts, it is women who harvest them in their individual fields and at the same time collect their leaves, which are used for animal nutrition (Interviews: woman A, K.B.; woman C, T.).

“Mais quand c’est le temps de la récolte, avant quand il n’avait pas la charrette, c’est les femmes qui prenaient les récoltes à la tête. Elles chargent ça sur la tête avec les plats pour venir mettre dans les grainiers. Mais maintenant comme il y a la charrette, ça c’est facile. Mais [...] pour les récoltes, là où l’homme seul travaille et que la femme ne fait pas, c’est quand ils coupent les tiges, pour récolter. Quand ils coupent les tiges, ça c’est un travail des hommes pour défricher. [...] pour aussi confectionner les grainiers, là où il faut conserver la récolte, ça aussi c’est l’homme qui tisse ça. Maintenant, tout le reste ils peuvent faire ensemble” (Interview: man S, T.).

While transporting the harvest from the fields to the compound was considered to be mainly done by women in the past, nowadays, as this task is facilitated by carts, it is rather children who generally conduct it (Interview: man S, T.). At the compound it is also young and small children who put cereals into the *grainier*, the household’s cereal store. It was emphasised that women do not enter these *grainiers* themselves but send children to bring them the amount of cereals sufficient for food preparation (FG men T.; Interviews: man L, K.B.; man S, T.).

After cutting the crops’ haulms and collecting the harvest, the last task of the agricultural season in the fields consists of collecting and tying up the remaining haulms and leaves that are used for animals’ alimentation during the dry season. Focus group participants in all research villages noted that this generally happens parallel to and after the harvest, from around September up to January.

“Pour amener encore les tiges pour les préparer en foin, donner aux animaux. C’est les hommes qui amènent les tiges et ils construisent des hangars, et ils prennent le foin qu’ils ont attaché comme ça, mettent ça, parce au moment où il n’y ont pas d’herbes pour les animaux, on donne ça aux animaux comme nourriture” (Interview: woman Z, Bog.).

While generally all members of a household who are available (most children are in school at that time) were reported to take part in this activity of collecting, tying up and transporting haulms and leaves for animals’ fodder, it is specifically men who construct the sheds in and around the compound on which the fodder is stored until use. Still, some male focus group participants in Toeghin discussed controversially if women would join them in the field to collect fodder or not. While one man stated that women who personally own animals should collect their fodder by themselves, another said that

if animals are taken care of together in a household both engage in fodder collection. Yet another man raised the issue that “quand une femme ramasse de foin comme ça dans le champ, c'est juste pour vendre et puis avoir l'argent, [vendre] à ces qui ont des animaux mais n'ont pas assez de foin” (FG change men T.; comment by a.) because women generally do not have access to land, which is needed to collect enough haulms for their animals' nutrition.

It has been shown in this chapter that all household members in rural crop-livestock systems in the research villages need to work together to accomplish all those tasks in the common crop field, which provides the whole household with a considerable amount of necessary food and additional income for a year. In this respect a woman in Bogoya stresses the importance of trust among married partners, as “tout c'est d'abord basé sur la confiance. Donc, s'il y a pas de confiance entre toi et ton mari, vous n'allez pas vous associer, faire un travail ensemble” (Interview: woman L, Bog.). A household's members are expected to support each other in terms of work and in times of hardships. For example if a man is sick, his wife or wives take over at least his most essential work responsibilities (Interview: man A, Bog.). However, in the case of child birth, sickness or overburdening workload of a woman, it has been observed that they also but not exclusively draw on family supporting networks. Women rather increasingly mobilise other local social networks like their village's or village *quartier's* women's group (FG women K.B.; FG women Bous.; FG women T.; Interviews: woman Z, Bog.; woman A, T.; amongst others).

**In conclusion**, women are generally expected to help men in all activities, especially concerning the common field (Interviews: man L, K.B.; woman A, K.B.). Even though men, women, girls and boys oftentimes work together in their common field, many of these activities appeared to be gender-differentiated. While this differentiation relates to unequal land, training and cash access opportunities, as well as perceived strength differences between women and men, it was also explained by a man in Koura-Bagre as “il y a des travaux, eux décident que ce sont vraiment des travaux des hommes, pour ne pas qu'elles fassent tout. Parce-que généralement les femmes les aident et elles préparent aussi à la maison” (Interview: man L, K.B.). Therefore, men's activities in relation to crop cultivation in all research sites include repairing agricultural tools, applying pesticides, collecting manure and constructing compost fosses. Additionally,

men are considered to be more implicated in planting trees against soil erosion (FG men K.B.; FG men Bous.; FG women Bous.; Interview man A, Bog.). Only in the northern research villages (mostly younger) men are exclusively implied in initially clearing the field from bushes and weeds and in utilising a plough, whereas in the central Burkinabe research sites women also take part in these two latter tasks. Common field activities in all research sites include field preparations such as ploughing the soil with a hoe and constructing RWM techniques, and also sowing, fertilizing, weeding and harvesting. Moreover, the construction of some RWM structures and harvesting include several gender-differentiated responsibilities. In turn, women's exclusive responsibilities contain water and food provision in the compounds but also in the fields and compost preparation, whereas children also seemed to be popularly implicated in these tasks. Furthermore, women appeared to be more strongly implied than man in sowing, fertilizing and weeding. While this was stressed by several female and male interview partners, participants in Toeghin's women's focus group even noted to be exploited by their husbands as they are sometimes left alone in the common field with the collective work (FG women T.).

Harvests of these common fields, which are owned by male household heads, are usually used for the whole household's nutrition during the dry and the following rainy season, or more realistically, as long as the harvest outputs last. Nevertheless, as there are considerable differences between households also in this respect, during the research process there has been only one exception noted, where women were required to work in the common field but to feed themselves, their children and their husband exclusively from the output of their individual fields (Interview: woman A, T.).

Individual fields are generally cultivated by the respective individual, mostly a wife and mother who receives her field from her husband, or a son who receives his field from his father. In the case of mothers, they are usually supported by their children if they are old enough. Responsibilities in relation to these individual fields' harvests are again subject to household-specific differences. Whereas some women control their own harvest outcomes themselves and can sell them to provide for their own, their children's and their family's needs (Interviews: woman Z, Bog.; woman O, K.B.), due to frequent food shortages and nutrition insecurities most women are expected to contribute to their households' alimentation (Interviews: woman S, Bog.; woman F, K.B.; woman C, T.; woman S, T.; amongst others), and in some cases to even provide alone for their households' whole alimentation and additional needs (Interview: woman A, T.).

Cultivation in crop fields is nowadays frequently supplemented by gardening, if there is access to a suitable water resource, as harvests of gardens provide important additional income for an individual or a household. But gardening, in contrast to cultivating in the field, is neither practiced nor practicable by all members (of a considerable age) of rural households in researched crop-livestock systems. Moreover, responsibilities in gardening are considerably different to the aforementioned gender-differentiated responsibilities in common crop fields, and the respective activities usually take place during the dry season, the off-season of crop production. Therefore, responsibilities and tasks in gardening have not been included in this chapter so far, but will be described in brief in this following last part.



Figure 11: Seeding nursery next to the mosque in Koura-Bagre (Source: photo by author).

Gardening activities usually start with the construction of seeding nurseries shortly after harvesting the crop fields, in November (FG women Bous.) or December (FG women Bog.). After re-planting the vegetable plants in the garden parcel in the ensuing month, all following activities include watering, weeding, applying pesticides and harvesting. These tasks are conducted frequently and rotationally for about four month, usually until April. While this pattern is similar in all research sites, women in Koura-Bagre mentioned to start earlier than gardeners in other villages. They produce seeding nurseries already in October and replant after 20 days, in November (FG women K.B.).

Each person is usually responsible for all of these tasks in his or her own garden, while tasks in common vegetable gardens or rice parcels, for example shared by a married couple, are subject to intra-household decision-making.

Due to the villages' different water infrastructures, diverse gender-differentiated gardening practices can be observed. In Koura-Bagre, where cultivation of onions is exclusively conducted by women, men only engage in digging holes in which women plant their onions and continue with all other tasks alone (FG men K.B.; FG women K.B.). On the contrary, in Toeghin no female focus group participant noted to engage in gardening, for which one needs to rent a garden around a barrage in nearby villages or towns as there is no gardening possibility in Toeghin itself (FG women T.). While vegetable production is predominantly but not exclusively undertaken by men in Toeghin, rice production parcels next to the local *bas-fond* were constructed and distributed by a Taiwanese project among both women and men, and are also cultivated by both of them (Field notes 2013, T.).

In Bogoya, where gardening is conducted by man and women alike, but where men have easier access to garden parcels because of inheritance rights and greater financial means, only women mentioned that they produce pepper in May and June, in addition their regular vegetable production from January to April (Field notes 2013, Bog.; FG women Bog.). Somehow similarly, women in Boussouma reported to cultivate in their gardens for a longer period of time than men do, who reported to finish by the end of April (FG men Bous.). As weeding in their rice gardens is conducted at the same time while sowing in the crop fields, the month of June is perceived by women to be very intense (FG women Bous.).

#### **6.2.4 Keeping livestock**

Keeping of animals is a very important element of livelihoods in researched crop-livestock systems. Livestock is perceived as an additional security for farmers, especially in times of hardships.

“[S]i tu vie au village comme ça et tu n'as pas d'animaux, c'est comme tu n'es pas en sécurité. Par exemple si tu as un problème financier, tu ne pourras pas facilement le résoudre. Si par exemple tu n'as pas fait une bonne saison. Parce-que généralement, après la production, ils finissent, ils ont seulement de quoi manger, mais pour avoir l'argent, il faut vendre quelque chose” (Interview: man A, Bog.).



As financial means are predominantly invested and bounded in livestock, animals can be sold to pay for various necessary things, frequently referred to as “problems”, like additionally needed food, health care or school fees, but also agricultural input resources such as fertilizer and working tools. While access to organic fertilizer is intrinsically linked to livestock ownership, chemical fertilizer is usually bought with the surplus generated through livestock selling, because most often animals constitute the sole saleable possession of a household. Therefore men as well as women in all research villages emphasised the importance of livestock keeping, of investing in animals to bind financial means and to be able to cope with low agricultural outputs and possible failed growing seasons. Especially for women personal possession of animals, which is not possible for all of them due to financial constraints on the one hand and social gender norms on the other, is of pressing relevance. Livestock ownership improves women’s decision making capacities, particularly in terms of contributing to their household’s welfare, and reduces their oftentimes problematic dependence on their husbands.

“Nous avons trouvé la nécessité d'élever, parce-que nous trouvons qu'il faut quand-même épuiser certaines ressources là-bas pour vraiment aider-, pour venir à résoudre nos problèmes. Par exemple si notre mari n'est pas là et puis tu as un enfant, qui est malade, tu ne peux pas forcément essayer de l'attendre. Si tu as un animal, tu peux peut-être vendre pour résoudre le problème, et payer les médicaments. Si par exemple tu dois t'asseoir attendre que le mari va venir, il va revenir trouver que l'enfant est décidé. Donc, c'est pourquoi nous élevons en plus de l'Agriculture pour quand-même essayer de pouvoir avoir des ressources à côté pour résoudre des problèmes. [...] c'est pour ça, que l'Elevage est devenu activité secondaire” (FG women Bog.).

The importance of owning animals is particularly obvious in times of insufficient food availability, mostly at the end of the dry and during the rainy season, and when facing acute payment pressures, especially regarding health problems and children’s school fees, which need to be paid in the late rainy season usually before the crop harvest is ready to be sold. Payment responsibilities regarding school fees and health care are subject to considerable variation within households. Even though fathers and male household heads are commonly perceived as responsible for their household’s members’ wellbeing, mothers or other female care-takers have been observed to assume a great share of this responsibility (FG women Bog.; FG women T.; Interviews: woman L, Bog.; woman F, K.B.; woman A, T.; amongst others).

Additionally, a man in Bogoya explicated another aspect, a more symbolic meaning that contributes to the importance of livestock keeping. Besides being able to sell animals to pay for households’ members’ health care, he noted that animals can take on a livestock

keeper's misfortune in terms of health problems but also otherwise and die in his or her place:

“[S]i quelqu'un n'a pas d'animaux dans sa vie, c'est comme sa vie n'a pas de sens. C'est très important parce-que l'animal même, c'est comme un autre humain. Donc, pour nous, l'animal peut aider l'autre humain à peut-être résoudre ses problèmes. Que, parce-que il y a des fois par exemple en dehors de fait que tu peux vendre l'animal pour résoudre tes problèmes, quand tu élèves un animal, un malheur peut arriver, un animal meure à la place. Par exemple quelqu'un devait mourir et puis l'animal meurt à la place de la personne. Qu[il y] a tout ça. Donc nous, nous ne pouvons pas nous assoir sans élever” (Interview: man A, Bog.; comment by a.).

While life in a rural household without animals is considered as very difficult and, as he put it, senseless, women and men face certain access difficulties to livestock ownership, which are partly common but usually show considerable determinations by gender-differentiated social norms. Therefore, general and locally specific aspects of women's and men's involvement in livestock ownership, raising and care, as well as internal (like underlying social perceptions) and external (like ecological and economic conditions) influencing factors and relevant respective changes will be discussed in this chapter.

While many women as well as men across all research sites stated to own and take care of all animals in the household together, livestock keeping and even more livestock ownership is generally perceived as being “for men”. This relates to the belief held by many men that women are not capable of properly raising their own animals, even though they are essentially implicated in daily caring activities of male owned animals in their households (FG women Bog.; Interviews: man O, Bog.; woman Z, Bog.; woman A, Bous.; woman A, T.; amongst others). This perception of men being more responsible and involved in livestock keeping is also reflected in and reproduced by the fact that women are mostly excluded from trainings and workshops concerning livestock keeping (FG women T.; Interview: woman L, Bous.).

“Que c'est à travers des formations que nous avons eu. Donc quand nous allons dans les formations, souvent avec des hommes, nous apprenons tous ensemble qu'on dit qu'il faut laisser la chance aux femmes de chercher. Donc c'est dans ça que d'autres ont compris, ils laissent les femmes élever. [...] Mais [beaucoup des] hommes nous interdit d'élever. Mais les hommes veulent toujours que nous les aident à regarder les animaux. Quand ils viennent, ils veulent que nous soit à la maison et [si] les animaux n'ont pas bu, c'est un problème. Donc il faut chaque fois les aider et puis laisser tomber ce que toi-même tu veux chercher après” (FG women T.; comment by a.).

Even if livestock keeping is permitted for a woman, many women noted that it is very difficult for them to get started with it, as one usually needs to buy animals at the

market. This is especially problematic for women as they generally have less financial means than men, which is mostly due to land access difficulties and specific financial constraints like aforementioned payments for their children's health care and education that require reselling their animals and hence starting anew. Alternatively to buying livestock oneself, women mentioned two other ways of accessing animals:

“Souvent, quand tu te mariée, quand tu quittes ta famille, quand tu pars trouver que dans ta famille, ça ne va pas, tes parentes peuvent te donner un animal d'élever. Et c'est à partir de ça, que tu élèves et à outre de ça deviens beaucoup, c'est pour toi” (FG women Bog.).

Next to this support by a woman's parents, there are also several organizations that implement projects in certain selected villages that specifically aim at helping women to get started in livestock keeping. This is understood as improving their lives by facilitating cash access. Similarly to trainings by an unknown organization in Toeghin (see above quote of FG women T.), in Koura-Bagre the NGO ADEFAD (Association d'aide aux enfants et familles démunis) also, but with seemingly more impact, engaged in counselling local men to change their minds about women owning animals in their (the household heads') compounds.

“L'ADEFAD est venu est ils s'intéressaient à toute les femmes, étape par étape. Et donc, qu'ils sont venus flatter les hommes pour qu'ils acceptent que les femmes élèvent. Parce-que ils ont pris des scénarios pour demander aux hommes si par exemple les hommes meurent pour laisser leur femmes et qu'elles ne peuvent pas cultiver correctement, il y a pas de l'aide, comment ils peuvent faire pour gêner les enfants à la famine. Et elles n'ont pas aussi de moyen. Donc, ça peut convainquait les hommes de laisser élever” (Interview: woman A, K.B.).

After these counsellings ADEFAD selected 40 women in a first and 50 women in a second round to give each of them three sheep, one female and two males, to initiate them in livestock keeping. Whereas only the male sheep needed to be returned after three years, women could keep the female and various new sheep. As these sheep were of a new foreign variety, called *Bal-Bal* or *Béla*, which is taller, more heat resistant and more expensive than the former Mossi kind, *Hourza*, local men also followed their women and switched to this new variety, profiting from higher market prices (Field notes 2013, K.B.; FG women K.B.; Interview: man L, K.B.; women A, K.B.).

While livestock keeping by women was subsequently accepted and is practiced in Koura-Bagre since about nine years, many women in Toeghin are still not allowed to own animals by themselves (FG men T.; FG women T.). Contrary, women and men in Bogoya and in Boussouma didn't mention any general restrictions in this respect. Some

women in Bogoya just mentioned occurring jealousy by men in some households of animal ownership by their wives (FG women Bog.).

As all women and men noted that buying and selling livestock is exclusively practiced by men, some women in Bogoya and Koura-Bagre mentioned that they, to prevent any problems caused by jealousy, subtract a small amount of the money received by their husbands from their animal sale and give it back to him. “Donc, quand tu fais comme ça, généralement c'est pas des problèmes avec des hommes” (FG women Bog.). As men are in charge of all negotiations and sales processes concerning their own and their wives' livestock and women do not take part in these, they cannot actually control this transaction and the money they eventually receive for their animals through their husbands. Not to be deceived financially, women in Koura-Bagre reported to inform themselves about current market prices since about ten years.

”Donc chaque fois nous passons par les hommes pour vendre notre animal. Et avant les hommes étaient un peu mal au tête. Quand nous vendons, ils vendent nos animaux, ils coupent une partie et vient dire, qu'on a payé comme ça. Nous n'avons pas le choix, nous devons prendre. Et dans ça nous enlevons quelques choses données. Maintenant comme nous avons accès aux informations au marché, quand nous voulons vendre, nous savons à peu près combien ça peut coûter. Donc on ne peut plus nous tromper. Donc quand le mari vend, il vend au prix normal avec beaucoup de transparence. [...] Il y a 15 ans les hommes vendaient sans rien nous dire. Sans transparence. Donc ce qu'il gagne il vient donner. Ça vaut 10 ans depuis que nous commençons à avoir des informations sur le marché” (FG women K.B.).

In relation to the kinds of animals owned by men and women in the four research sites, there are mainly chicken, goats, sheep, donkeys and cattle. Additionally, pigs are only common among Christians in the central Burkinabe research sites and, without any underlying religious reasons, ducks have also only been observed in these southern villages. While generally all of them can be owned by women and men alike, cattle, being the most valuable animal, was observed to be exclusively owned by men.

“[P]ar rapport aux bœufs, c'est lié plus aux moyens. Parce-que les femmes franchement n'ont pas l'argent pour s'acheter les bœufs. Les petits ruminants ça va, on peut acheter, même si tu n'as pas l'argent, tu peux demander l'argent à quelqu'un [...], un crédit comme ça. [...] Mais si c'est un bœuf, si tu pars prendre l'argent beaucoup, peut-être 150 000 FCFA ou 100 000 FCFA pour acheter un bœuf, [...] comment tu vas rembourser ? C'est difficile, c'est trop pour toi ! Donc, chacun achète les animaux qu'il peut, dans ses moyens, peut vraiment entretenir” (Interview: woman L, Bog.).

In relation to animal species, one positively perceived change in Koura-Bagre is the introduction of the new sheep variety *Bal-Bal*, whereas a negative one in relation to livestock keeping is, that it's not possible anymore to own and raise a large number of

animals like before because there is not enough space for pasture available (Interview: man L, K.B.; woman A, K.B.). While this lack of pasture land was mentioned exclusively in northern research villages, diminishing numbers of animals per household were observed by farmers in the central Burkinabe villages as well. In Boussouma increased animal sicknesses were reported by some interview partners as a major reason for this (Interviews: man I, Bous.; woman A, Bous.; woman L, Bous.) and in Toeghin the problem of rising animal thefts was stressed as contributing to frequent animal losses (FG men T.; Interview: man S, T.). Besides that men and women in all four villages mentioned rising livestock prices and increased financial means that are required to take care of animals nowadays, to pay for their additional alimentation and health care. These higher investments in animals' wellbeing are reflected in a major change in farmers' perception on livestock keeping in general, driven by improved knowledge on animals' alimentation and health needs, and most importantly, by a growing and profitable livestock market:

“[V]raiment l'Elevage est devenu une autre activité sérieuse pour tous ménages. Parce-que dans l'Elevage on peut en tout cas, faire des profits, plus que avant. C'est pourquoi les gens qui élèvent aujourd'hui sérieusement, ils s'occupent bien des animaux. Quand par exemple tu vas élever, si tu achètes des animaux, tu fais un hangar sur lequel on va mettre les herbes sèches. Et après tu t'assures que chaque fois les animaux on à boire, ont à manger. Et tu les ne laisses pas aller dans les saletés. Avant, les gens achètent les animaux, ils les attachent à la maison, c'est fini. Il ne considère pas, c'est juste [...] pour le fait de privilège d'avoir des animaux. [...] Donc, c'est comme si c'est aujourd'hui un Elevage du marché, ça veut dire on élève pour vendre” (Interview: man O, Bog.).

Activities and responsibilities in livestock care (general ones as well as new ones resulting from this perception change during the last twenty years) and gender-differentiated involvement in these tasks are subject to seasonal variation, which was shown by women and men in focus groups' seasonal calendars.

During the first month of the dry season animals can still feed themselves from fresh greens and are mostly guarded by children while pasturing (Interview: man A, Bog.; man M, Bog.; women A, K.B.; amongst others). Particularly in the northern villages, some men mentioned to hand over their cattle to Fulani herders for pasture. They return the cattle again when there is no more grass and leaves in the surrounding land for them to eat (Interviews: man M, Bog.; man L, K.B.). As water and hence also greens become increasingly rare in the course of the dry season, animals are usually kept at and around the compound and are fed with haulms and leaves, which have been collected from the crop fields after harvest from around September to December. Daily alimentation at the

compound is needed from around January to May and is especially difficult between March and May, demanding a lot of time and energy because of resource scarcity (FG women Bog.; FG women Bous.; FG men K.B.; FG men T.). Women, and also children have been noted to be particularly engaged in feeding, watering and caring for animals in this season (FG women Bog.; FG women Bous.). While many man and women mentioned to take care of their animals together, both reported that women and children are more implied in daily caretaking responsibilities, especially watering, because they are more frequently around the compound (Interviews: man M, Bog.; man O, Bog.; woman Z, Bog.; woman A, Bous.; man R, K.B.; women A, T.; amongst others).

“Mais maintenant, à la saison de pluie, c'est là où je pense qu'il y a beaucoup des difficultés, parce-que souvent, nous les femmes, c'est à nous de faire sortir les animaux. Parce-que l'homme n'a pas de temps. Donc, c'est nous qui s'occupons des animaux, nous faisons sorties des animaux et nous les donnons à manger” (Interview: woman Z, Bog.).

Livestock care during the rainy season is even more difficult, because farmers are increasingly occupied in their crop fields. But at the same time it is also more important because animals need to be prohibited to graze in growing crop fields and destroy precious harvests. While some ox are selected for cultivation purposes, it is again children who are particularly implied in livestock care from May to August (FG men K.B.; Interviews: man M, Bog.; woman L, Bog.; woman Z, Bog.), and are supported by adults especially during the crucial harvest time (FG men Bous.). While in many households animals are confided to children for pasturing, in others they are kept at the compound, where they are fed and watered predominantly by women and children (FG women Bous.; FG men T.; FG women T.).

Regarding animals' alimentation, in addition to fresh greens and dried haulms, nowadays animals also receive salt and a certain supplement produced out of cotton seeds, the *Tourteau*. These additional dietary supplements are given to animals during the late dry and early rainy season and were reported to improve animals' strength and weight, as they allow them to eat and drink sufficiently. While these products are perceived as important to properly take part in and profit from market-oriented livestock keeping, they need to be bought at the market and thus strain farmers' limited financial capacities. Therefore, their use depends on a household's financial situation (FG men T.; Interviews: man O, Bog.; man L, K.B.; woman A, K.B.; man J, T.; man S, T.). Payment responsibilities for animals' alimentation are, like care taking, generally shared among households' members, whereas men were noted to be particularly involved in paying

fodder, especially for his or for commonly owned animals (FG men Bog.; Interviews: woman F, K.B.; man S, T.). Women who need to buy such dietary supplements for their own animals by themselves reported to face major difficulties and oftentimes only use fodder they can prepare by themselves, such as haulms and leaves from their crop fields (FG women Bog.).

Next to alimentation habits, animals' health care is also substantially influenced by the reported change in farmers' perception on livestock keeping. Animals' health situation is more precisely monitored by its owners and other caretakers in the respective household, and veterinarian services as well as pharmaceutical products are increasingly used in all research sites, especially during the last ten years. An important incentive that facilitated access to vaccinations and increased their prevalence, are annual vaccination campaigns in certain villages where small ruminants and cattle are vaccinated in bulk for lower costs. Next to these common vaccinations, there are a few veterinarians per district, provided by the government, who can be called to seek information or to assist in a health emergency. It has been stressed by men and women in all research villages alike that only men call the veterinarian and arrange for visits and vaccinations. It is also most of the times men who pay for veterinarian services, but it is subject to household-specific differences if men pay only for their own or for all animals in a household (Interviews: woman L, Bog.; man L, K.B.; man S, K.B.), or if women also pay for either their own (Interview: woman A, K.B.) or their husband's animals (Interview: woman A, T.). A woman in Bogoya mentioned that her husband pays for vaccinations for all animals in their household, his own, their common ones and hers, but this also means that she cannot prohibit him from using her animals if he is in need of an animal to sell (Interview: woman L, Bog.).

Besides vaccination campaigns, information distributing workshops or projects and enhanced access to veterinarian services via increased cell phone use, farmers themselves importantly contribute to the widespread positive perception and perceived necessity of improved livestock health care, as they share informations about livestock keeping and counsel each other, reinforcing good practices and working habits:

“Entre eux, chaque fois ils se partagent les expériences. [...] Donc, à cause de ça [...] nous s'assurons que les animaux sont bien nourris, ils boivent bien. Si un animal est malade, nous cherchons pour trouver la solution, on peut appeler quelqu'un pour venir regarder, ou bien s'il faut lui donner médicaments ou lui vacciner, je le vaccine. Donc, à cause de tout ça, tous ces conseils qu'il gagne et aussi à cause de faite que

aujourd'hui aujourd'hui l'Elevage est devenu une activité des profite pour eux. Donc, ça fait que si tu as des animaux, si tu les laisses mourir, si tu as un problème que tu devais résoudre avec un animal qu'il faut vendre, tu ne peux pas laisser va chez quelqu'un 'ah, donne-moi ton animal, je veux aller vendre pour résoudre mon problème'. Il va te dire 'mais tu as laissé tes animaux mourir, je ne veux pas t'aider'. [...] C'est à cause de ça, les conseils que je gagne des autres sont précieux. Et je travaille avec ces conseils à s'assure que vraiment les animaux sont bien entretiens" (Interview: man O, Bog.).

**In conclusion**, access to veterinarian services, vaccinations and improved alimentation result in enhanced livestock care, which is perceived positively as reducing animal sicknesses (FG women Bous.; Interviews: man O, Bog.; woman Z, Bog.; woman A, K.B.; amongst others). These practices counteract animal and thus financial losses, as animals are kept as a security, as valuable assets that complement agricultural crop production. Driven by a growing and profitable livestock market, livestock keeping and selling are increasingly important in local crop-livestock systems, being used to compensate bad harvests and allowing farmers to meet their needs and responsibilities, most importantly in relation to their households' alimentation, health and education. Still, access to and ownership possibilities of livestock are constructed very differently for men and women, as livestock keeping is commonly perceived as a male activity. While women frequently own animals by themselves or jointly with their husbands in all research sites, female animal ownership is forbidden in some households, or as some interview partners put it, in their "compounds", which are perceived to be owned and controlled by the (male) household head. Generally, female animal ownership has been observed to be a very recent change, as women mentioned to be allowed by their husbands to own animals since about nine years in Koura-Bagre and only since about four years in Toeghin. But even if women are allowed to keep their own animals, they face specific financial constraints to buying and keeping them. Furthermore marketing of livestock is only practiced by men, which means that women need to pass through a male family member, usually their husband, to be able to buy animals or to sell them in order to receive needed cash. Also, livestock health care has been observed to be a male domain, as it is usually men who communicate with the veterinarian and who take animals to vaccination sites.

Somehow contrary to male-associated and dominated livestock ownership, women, and also children are particularly implied in daily caring activities of their household's animals. While children are expected to pasture with animals during the rainy and early



dry season, it is mostly women and children who water and feed animals at the compound during the late dry season and throughout the rainy season. Especially tasks related to watering, feeding and looking after animals on a daily basis were noted to have increased significantly in the course of enhanced livestock care and livestock health awareness.

“[A]vant les animaux mouraient. Mais maintenant, je pense que ça va. Parce-que quand les animaux mouraient, c'était parce-que il n'y avait pas de la connaissance. Les gens n'étaient pas aussi suffisamment informés sur l'Elevage. Maintenant, nous considérons les animaux comme les humains. Par exemple quand il y a un animal qui ne mange même pas du tout, tu constates que un animal ne broute pas, ou bien il est bizarre, tu peux aller appeler un vétérinaire, il va venir voir ce qu'il y a. [...] Actuellement, à coté Elevage, nous connaissons tous, nous connaissons tout ce qu'il faut porque les animaux sont en bonne santé. Mais c'est le moyen pour vraiment faire, qui est difficile souvent” (Interview: man A, Bog.).

Such informations on livestock keeping are received by veterinarians, by governmental institutions like INERA, the *Service de l'Elevage* or *Agents Techniques de l'Agriculture*, and by several NGOs, such as ADEFAD in Koura-Bagre, and their respective projects. Generally, men are much more implicated in such projects and information distributing meetings or workshops, while women are only partly and recently considered and incorporated, if they are at all. While such incentives can be influential, like ADEFAD's impact on livestock ownership possibilities by women in Koura-Bagre, it has to be acknowledged that there are multiple factors that interact to induce changes in societal perceptions. In the case of Koura-Bagre, such factors may include ecological insecurity, demographic pressure, intensified dependence on cash incomes, increasing market-orientation of farming, and economic considerations like facilitated access to a new and more profitable animal variety in the context of increasingly important livestock markets.

### **6.2.5 Access to input resources and services**

Access to input resources such as information, credit and cash, improved seed varieties, fertilizer, pesticides and working tools, as well as to relative extension services is crucial for agricultural production in resource-constraint local crop-livestock systems. Especially in the context of changing environmental and economic situations, access to material and immaterial agricultural inputs is important for rural livelihoods of women, men and their households. “Nous savons que la pluie-, il ne pleut pas assez. Mais les

nouvelles variétés nous permettent d'avoir un peu, avec les connaissances et les engrais nous gagnons toujours un peu" (Interview: woman L, Bog.).

Access to knowledge is considered as particularly important for agricultural work in today's challenging environmental conditions. Informations on cultivation techniques are primarily passed on within a family from one generation to the next, as family members cultivate their fields together (Interviews: man O, Bog.; man L, K.B.; woman F, K.B.; man S, T.; amongst others), and also within a village community, by observing and sharing new informations and insights.

"[P]ar rapport à la moisson aussi, il y a la pluie mais il y a la connaissance de nos jours. Parce-que même si tu es commerçant aujourd'hui aujourd'hui, si tu n'as pas la connaissance, tu ne peux rien avoir. [...] De nos jours, on ne peut pas avoir de la connaissance sans avoir la connaissance de quelqu'un. Ça veut dire que, la connaissance ne vient pas comme ça. On gagne toujours. Même si tu vas peut-être regarder en façon de comment quelqu'un autre travaille, tu peux faire la différence entre sa manière de travail et toi ta manière. Que, en fonction de ça, tu peux comprendre ce qu'il faut, [...] tu dois savoir maintenant ce qu'il faut faire pour être comme cette personne si sa production est bonne. Donc c'est pour dire que, avec les autres comme on apprend" (Interview: man O, Bog.).

Next to learning from each other's cultivation techniques village-internally, newly gained informations from workshops, meetings or other project initiatives, are shared by the respective participants with the wider village community (FG men K.B.; Interviews: man S, K.B.; woman O, K.B.). Such initiatives to distribute and reinforce knowledge by various institutions and organizations from outside a village were considered as valuable and desired by most interview partners and focus group participants. But in general, opinions ranged from trust in local cultivation practices without any desire to seek informations from outside, to the necessity of gaining improved knowledge, and the need for more workshops and trainings.

Also, opportunities and constraints in accessing information and technical services were perceived differently among village members. This is due to the selective nature of participation in the respective information and training initiatives, whereas selection criteria include gender, age, social status, education and former project involvements. For example, in Koura-Bagre access to information and extension services was perceived as easy by most interviewees and focus group participants as they mentioned that many people in the village are interested in agriculture and many different *Agents techniques* come to work with them. Thus, information is generally available and accessible either directly or indirectly as usually only a small number of people per

village is selected to participate in workshops or meetings who pass informations gained on to other community members (FG men K.B.).

”Donc, par rapport à l'accès aux informations, comme, ces qui s'intéressent à l'agriculture sont beaucoup. Donc, les gens viennent. Différents secteurs viennent. Que bétail vienne souvent, c'est pas pour toucher tout le monde. On peut enlever un certain groupe, on travaille avec eux pour les membres de groupement parlent de travail. De diffuser ça pour le reste de la population qu'on n'a pas pu toucher” (Interview: woman A, K.B.).

Still, considerable gender-differentiated participation in these information and training initiatives has been observed. Another woman in Koura-Bagre noted, that even though supportive institutions and organizations like the government-related *Agents techniques de l'Agriculture* operate in the village, they do not cooperate with women: “Que même si les Agents techniques de l'Agriculture arrivent ici, il vient s'entretenir avec mon mari mais pas avec les femmes” (Interview: woman F, K.B.). This increases women's access difficulties to informations, leaving the distribution subject to village- and household-intern power structures.

Additionally, Venn diagrams drawn by focus group participants showed that men are considerably better connected to institutions and organizations outside their village. While women frequently also mentioned ATA, INERA and local credit institutions like the *Caisse Populaire* as important partners for their agricultural work and rural life, other institutions like FNGN or the local *Mairie*, and more particularly NGOs have most often been mentioned by men, and veterinarians were exclusively referred to by men. The fact that men are connected to and cooperate with more extra-village institutions and organizations than women was also reflected in personal interviews. These also showed that even when men are not directly involved in cooperations and extension services themselves, they appeared to be considerably better informed about such partners from outside their village than women were.

Among the most important cooperation partners for access to information, the state-related ATA were mentioned particularly often by farmers in all villages, who stressed the importance and value of their counsels (FG men K.B.; Interviews: man M, Bog.; woman L, Bog.; amongst others). ATA distributed important informations concerning issues such as the cultivation of smaller fields with higher productivity, RWM techniques (FG men K.B.; FG women K.B.; Interviews: man I, Bous.; woman C, T.), crop rotation to increase soil fertility particularly for old fields (Interviews: man M, Bog.; man R, K.B.), fertilizer use by mixing chemical and organic fertilizer (thus

increasing efficiency and reducing the amount of chemical fertilizer that needs to be bought by farmers) (FG men K.B.), and use of pesticides on beans (FG men K.B.; Interview: man M, Bog.). While they were commonly said to be accessible to farmers in case of any questions about current cultivation problems, only interview partners in Boussouma reported that ATA do not frequent them anymore like they did some 40 years ago (Interviews: man I, Bous.; woman L, Bous.).

In addition to ATA, FNGN conducts similar trainings and information workshops. Issues addressed by them include RWM techniques (particularly the promotion and construction of stone bunds) (FG men Bous.; Interviews: man L, K.B.; woman A, K.B.), and gardening, as they introduced gardening techniques in Boussouma about 15 years ago and also took part in constructing a dam and related gardens together with local women's and men's groups (FG men Bous.; FG women Bous.).

Besides these counsels, both cooperation partners also frequently gave away new seed varieties, fertilizer and pesticides for testing (Interviews: man L, K.B.; man S, K.B.; woman A, Bous.). For example, ATA introduced a new variety of beans via field trials that grows faster than the former variety and can be harvested before millet (Interview: man A, Bog.; man M, Bog.), distributed corn seeds (Interview: man R, K.B.), and gave away a pump for pesticides application on beans (Interviews: man M, Bog.; man S, K.B.). Especially the new short-cycled bean variety was reported to have considerable impacts on local cultivation, nutrition and marketing practices, as it is well-liked (in contrast to the former bean variety) and has been increasingly integrated into local consumption habits. Therefore it can be sold profitably and is cultivated particularly to gain money to arrange various "problems", arising from financial dependencies (Interviews: man A, Bog.; man S, K.B.; woman O, K.B.; amongst others).

As all four research sites are villages that take part in CPWF-V2 project activities, they were all concerned by field trials conducted by the Burkinabe scientific and technological research institute INERA. In the course of these field trials, selected project participants, exclusively male village inhabitants, were given short-cycled seed varieties of millet, sorghum and beans as well as fertilizer to test in their private fields, which are households' common fields (Interviews: man M, Bog.; man L, K.B.; man R, K.B., woman A, K.B.; man H, T.). While these field trials were conducted in the year 2012, several village members, both women and men, mentioned that they already received various seeds for testing by INERA during the last years (Interviews: man L, K.B.; man E, Bous.; woman L, Bous.).

Next to these three organizations, government-related institutions as well as various NGOs, operating at regional, national or international levels, were reported to play important roles in accessing information, trainings and material resources. In Bogoya, farmers received support in gardening by the NGO OCADES (Organisation catholique pour le développement et la solidarité), who distributed tomato and onion seeds as well as fertilizer on credit in the last six years. Additionally, they conducted information workshops and trainings on tree planting to counteract soil erosion for about eight years (Interview: man A, Bog.). In Koura-Bagre, the NGO *Burkina Vert* and the governmental institution *Service de l'Elevage* were noted as important cooperation partners. While the first one supported women in gardening by improving an existing well construction and donating onion seeds and fertilizer (Field notes 2013, K.B.; Interview: woman A, K.B.), the latter conducted agricultural trainings and gave away seeds of beans and millet, fertilizer, pesticides and pumps for their application (FG men K.B.). The *Service de l'Elevage* was also reported to have introduced the practice of producing livestock fodder from crop fields' haulms and leaves, which is now done for three years in the village (FG men K.B.). In Boussouma the African Development Bank's project P.D.R.D.P. was considered as most important besides ATA and FNGN. It promoted the RWM technique of stone bunds and also constructed 10 ha of gardens as well as an Alphabetisation centre in the village (FG men Bous.). In Toeghin it was ALVP that first introduced stone bunds in 1987 (Interviews: man J, T.; woman S, T.), while it also conducted trainings on compost fosses (Interview: man J, T.). Additionally, the district's *Mairie* in Komsilga was reported to have distributed information and trainings on compost fosses by contacting the village's household heads (Interviews: man H, T.; woman A, T.).

Looking at this presentation of cooperations that are perceived as having the biggest impact on local cultivation practices, it is obvious that men are involved more frequently and in greater scope in trainings and workshops. Therefore, it is men who profit directly and primarily from informations about techniques in cultivation, RWM, fertilization and pest control, but also from distributions of material agricultural inputs. These new techniques and input resources are implemented and tested in households' common fields, which are usually cultivated by all household members and which are commonly, but not always, dedicated to the whole household's food provision. Even though all household members, men as well as women, can theoretically profit from an allocation of input resources and services in such a way, it has to be acknowledged that

these large common fields are prioritized in regard to various input resources anyway. Furthermore they are exclusively owned by men, which means that men control eventual earnings from harvest sales, but women do not control decisions concerning the common fields' production or harvest use.

Other means of access to seeds include, first of all and most popularly used, re-sowing one's own seeds that have been collected and saved from last season's harvest (Interviews: man M, Bog.; man R, K.B.; man H, T.). Access to fertilizer, primarily organic, naturally depends on the amount of animals personally owned, and also on the knowledge and ability to produce compost. While common fields appeared to be prioritised in the distribution of a household's manure and compost, women's individual fields are fertilized with the remaining amount. One possibility to increase access to organic fertilizer for women's fields was mentioned by a member of a women's group in Koura-Bagre, who produces compost together with her co-members, which is distributed specifically on their individual fields (Interview: woman A, K.B.).

Furthermore, seeds, fertilizer and pesticides for crop as well as vegetable production can of course be purchased at markets, providing that the desired variety is available at the local market. Some interview partners mentioned that they prefer to purchase new and improved seed varieties and test them to see if they work on their respective fields.

“Souvent, quand nous allons sur la place de marché, nous achetons de semence pour venir et travailler avec. Si ça ne marche pas, si nous entendons parler d'une autre variété, qu'il soit être meilleur, qui est disponible sur le marché, nous partons acheter pour venir essayer” (Interview: woman F, K.B.).

It has also been mentioned, that new improved seed varieties, derived from field trials, can be purchased from other villagers who haven't been implicated in the trials (Interview: man A, Bog.). However, the ability to purchase agricultural input resources at the market always depends on personal financial capacities and strains farmers' limited budgets (Interviews: man L, K.B.; man E, Bous.; man J, T.; man S, T.; women A, T.; amongst others). This is especially problematic in times of insufficient rainfall, when cereal prices are high and thus even more money needs to be spent on food provision.

Access to agricultural working tools is characterized by a similar situation. They have been reported to be “introduced” and sometimes also distributed selectively by various cooperation partners, frequently on credit (Interviews: man L, K.B.; man I, Bous.). But

most of the time they need to be bought at local smiths or vendors (Interview: man O, Bog.). Whereas a hoe or *daba* was observed to be the most common and most essential working tool, owned by every household, ploughs are not as widespread despite their increasing importance for local cultivation in terms of productivity, time and energy input (Interviews: man M, Bog.; woman O, K.B.; man E, Bous.; amongst others). Even though their prevalence is continuously rising, ploughs still aren't owned or used by all households, due to financial access constraints. But even if a household doesn't own either a plough or an animal to draw it, which is an ox or a donkey respectively, some men mentioned to negotiate with friends to lend it to them (Interviews: man O, Bog.; man L, K.B.; man L, Bous.).

Generally, ploughs have been known in all research sites for several decades. In Boussouma they were said to have been introduced by missionaries more than 50 years ago (FG men Bous.). While it was stressed that, until about 10 years ago, ploughs were not as popular as they are today (FG men T.; FG women K.B.), the actual use of ploughs in personal fields of interview partners ranged between 40 (Interview: man S, T.) or 30 (Interviews: man E, Bous.; woman A, Bous.) to 15 years (Interviews: man I, Bous.; woman A, K.B.). While this refers to ploughs pulled by an ox, there are also other, smaller and lighter ploughs that are specifically pulled by donkeys. These were reported to be newer, known for about five (Interviews: man M, Bog.; man L, K.B.) or 15 years (Interview: man I, Bous.).

Regarding gender-differentiated access opportunities to ploughs, power structures inside households play significant roles. As ploughs have been observed to be commonly owned by men and usually even only by the household's head, actual access is determined by individual negotiation power and by competition of multiple household members, as a household mostly only owns one or two ploughs for all cultivators and fields. Competition is therefore intensified by scarcity, by the number of potential users and fields, and also by time constraints as ploughing is only optimal during the first rainy days. In polygynous and in multi-generational households, access to a plough for working in individual fields is especially difficult (Interviews: woman Z, Bog.; woman F, K.B.; woman A, T.) and women in Boussouma describe: "Nous négocions avec notre mari, pour nous donner le bœuf avec les enfants pour nous aider. Il y a des moments il accepte, il y a des moments il n'accepte pas" (FG women Bous.).

As these material input resources need to be bought at local markets if they cannot be produced sufficiently by oneself or are not received by a project, access to money is crucial. Generally, cash is acquired either via selling of livestock or of agricultural produce from gardens or crop fields, most notably beans, groundnuts and sesame, or via credit. Whereas credits can be used instead of selling agricultural products or livestock, it can also be used to support such sales activities. This happens insofar as improved livestock alimentation such as dietary supplements can be bought to increase livestock's market value, and crops can be sold at times of more favourable market prices instead of directly after the harvest, when prices are particularly low but money is crucially needed to pay for children's school fees and other acute financial dependencies. Furthermore credits could be used for buying instead of selling crops after the harvest, to stock and resell them at times of higher market prices to make profits.

“Parce-que au moment où ils font les récoltes, à la maison c’est difficile, il n’y a pas d’argent. Donc nous sommes peut-être intéressés de pouvoir acheter, déposer et vendre pour faire des profits. Si je pouvais m’entendre avec les banques, pour avoir du crédit, je peux faire ce travail aussi. Acheter à bas prix, stocker et après revendre pour faire du profit et rembourser notre argent contracté avec la banque. Mais [...] de ce côté c’est un peu difficile. Quand les trucs [champs] sont vieux, généralement je vends, je sais que je vends ça à bas prix, c’est pas le bon moment de vendre mais c’est ça aussi la difficulté. Nous sommes obligés de vendre souvent pour arranger certains problèmes” (Interview: man L, K.B.; comment by a.).

The most notable official credit institution in rural Burkinabe areas is the *Caisse Populaire*. Whereas it has multiple branches in cities, smaller towns and also villages throughout the country, it is only directly present in one research village, in Bogoya (FG men Bog.; FG women Bog.). Some farmers in Koura-Bagre mentioned to use a branch in the nearby village of Ziga (Interview: woman A, K.B.) and some farmers of Toeghin are attached to their closest *Caisse Populaire* in Saponé (FG women T.). Especially in the early days of this institution's outreach, many farmers opened accounts and profited from savings and credit opportunities. But in the last years, working with the *Caisse Populaire* proved to be difficult as conditions were tightened. Especially short and inflexible credit durations and high guaranties requirements were reported to prohibit local farmers from obtaining credits (Interviews: man A, Bog.; man M, Bog.; man O, Bog.; man J, T.). Besides these difficulties, a woman also mentioned, that she is afraid of working with credits, as she considers her individual fields as too small to be able to repay a credit plus interests (Interview: woman L, Bog.). Still, there are several people who reported to use the *Caisse Populaire's* services, even if it is just to withdraw money



from and add to one's private bank account, as it is the only official institution where local farmers can gain credits from (Interviews: man M, Bog.; woman S, Bog.; woman Z, Bog.; woman C, T.).

Alternatives to this institution are partly available, but not always accessible by everybody, as some require memberships in certain official groups. For example, a credit agreement by an official *groupement* at the *Banque agricole* was mentioned (Interview: man S, K.B.). Other credit opportunities are specifically dedicated to gardeners, like one by the NGO OCADES (Interview: man A, Bog.) and another one by FNGN (Interview: man I, Bous.). Women gardeners in Koura-Bagre also reported to have access to credit for gardening purposes by FNGN, whereas this is due to a specific connection established by a middle man who comes from their village (Interview: woman F, K.B.).

Facing these regulated and restricted credit opportunities, many interview partners expressed their view that accessing credits is difficult for them, even though they would want to use them (Interviews: man M, Bog.; man L, K.B.; man L, Bous., woman S, T.). If credits were obtained or bank services like personal accounts were used, both men and women were noted to do so, whereas women were noted to be confronted with more access and repaying difficulties due to their generally lower financial capacities, fewer animals and smaller fields. Another, contrary, gender-specific difference in credit access was expressed by some women (Interviews: woman L, Bog.; woman A, K.B.), who reported that women are generally perceived as more reliable than men in paying back credits, and that "les gens n'aiment pas donner les crédits aux hommes, parce-que souvent ils n'aiment pas respecter les termes" (Interview: woman A, K.B.).

As access to official credit structures is linked to several difficulties and constraints, families and intra-village social networks are essential for borrowing urgently needed cash. Commonly, grown-up children and those who receive some financial income donate money, food or animals to support their parents, particularly their mothers, most importantly but not exclusively in times of hardships (Interviews: man M, Bog.; woman L, Bog.; woman F, K.B.). Among a village community, money can be temporarily borrowed from other villagers (Interview: woman L, Bog.) and also, more specifically, from co-members of a group. In all research villages many groups, male-only, mixed and often women-only, which are partly initiated for specific production purposes, have been noted to exist. One example is a group of Muslim women in a Toeghin neighbourhood, who's members help each other with temporarily high workloads and

try to save money collectively (Interview: woman A, T.). Another notable example for a seemingly well-functioning, savings-generating and credit-providing network is the women's group *Wiz Menga*, "forcing oneself to get up and struggle", in Koura-Bagre. The group actually consists of three similar sub-groups, whereas each of them conducts weekly meetings where all of its members donate a certain, commonly agreed-on amount of money to their own common fund. Additionally, the women conduct various available jobs together (like helping each other out in their fields or gardens, constructing a compound's floor, or helping with the collection of stones for stone bunds construction) and add the respective earnings to their fund. If members are in need of money, they can obtain credits while respective interests also feed the collective fund, which is distributed equally among the group's members twice a year (Field notes 2013, K.B.; FG women K.B.; Interview: woman A, K.B.).

"Et *Wiz Menga*, ce que nous faisons tous les Mardis, les cotisations là. Là-bas on peut faire des prières. Même si tu en prends l'argent et tu veux venir pour rembourser, même si le taux qu'on dit de rembourser-, si tu rembourse le taux là, c'est encore pour toi. Mais là-bas [Caisse Populaire] tu dois payer un taux d'intérêt qui est pour la banque" (Interview: woman A, K.B.; comment by a.).

**In conclusion**, access to immaterial input resources such as information and training in agricultural production techniques is first of all acquired through one's parents, elder family-members and in exchange with other village members. Additionally, government-related institutions, technical agents and NGOs distribute information on new or revised cultivation techniques, on RWM, on production and use of fertilizer or livestock alimentation. Access to material input resources such as fertilizer, pesticides and seeds, mostly new improved ones with a shorter growing cycle adapted to shorter rainy seasons, can also be acquired through these village-external cooperation partners. But participation in such workshops or field trials is usually only possible for a smaller number of, mostly male, selected participants in a village. Next to gender, other selection criteria such as social status, age, education and former project involvements have been observed to significantly influence project participation.

Whereas crop seeds are generally derived from last season's harvest, organic fertilizer is acquired by one's animals, as their manure is either directly used or included in compost production. Because of a general prioritization of common fields in respect to the distribution of available input resources of a household, as well as constraints in

livestock ownership, women face increased difficulties in accessing organic fertilizer for their individual fields.

Access to working tools like ploughs is insofar gender-differentiated as they are commonly owned by men and access for individual fields needs to be negotiated in competition with multiple household members.

Furthermore, needed cash to acquire input resources at the market is accessed via sales of livestock, gardening and crop production, and via credits. Determining factors include gender-specific access opportunities to animals and land as well as general access difficulties to credit services by institutions such as the *Caisse Populaire*. Other credit opportunities are restricted to gardeners or to members of certain groups, whereas village-internal women's groups have been observed to be of particular importance. They are frequently engaged in group-internal money-saving and credit-distribution activities, as well as in supporting its members in income generation, in sharing of workloads and also in accessing fertilizer.

#### **6.2.6 Processing and marketing**

While marketing agricultural produce, including livestock, is crucially important for women and men in local rural communities, certain gender-differentiated responsibilities and perceived capabilities contribute to different involvements in marketing activities. As local markets are growing and prices for agricultural products are rising, market structures are increasingly integrated in agricultural production habits. This integration affects the market the other way round too, of course.

“Avant, vraiment le prix n'était pas chère mais aujourd'hui les prix ont évolués sur le marché. Parce-que c'est lié à la famine. Et aussi parce-que il ne pleut pas assez. Quand il ne pleut pas assez, les gens aussi-, tous ces qui ont un peu de la production, ils veulent vendre pour acheter d'autre nourriture disponible. Ils veulent faire beaucoup des profits pour pouvoir avoir d'argent et être capable d'acheter d'autre nourriture” (Interview: woman A, K.B.).

Participation in buying and sales activities is increasingly perceived as necessary to sustain livelihoods in local smallholder crop-livestock systems. They are needed to compensate insufficient crop harvests and to provide cash for multiplying financial dependencies and generally rising livelihood costs (Interview: woman L, Bous.).

While processing usually adds surplus to agricultural produce and is therefore considered as an important possibility to increase sales profits, participation in related tasks is significantly determined by social gender norms. Processing agricultural

produce is generally associated with food production, and thus perceived as a woman's sphere of action. In this context, no male but most female interviewees mentioned to process one or another product into foodstuff for sale. Notably, women frequently do not use their own field's harvest, but rather prefer to purchase necessary ingredients. Some women explained that, in doing so, they can differentiate more easily between their earnings and expenditures, as they sell their own harvest separately (Interviews: woman L, Bog.; woman O, K.B.). Processed and sold foodstuff in research sites popularly include cooked beans, roasted groundnuts, *nyion* (snack containing millet and bean leaf), *samsa* (beignet containing beans flour), cakes (using imported wheat flour), galettes (usually containing millet flour), and drinks such as the hibiscus-juice *bissap*, the millet-drink *ZoomKum* (traditionally only prepared for special occasions, and only commercially sold in towns, with the exception of Bogoya (Field notes 2013)), and the sorghum beer *dolo*. Regarding the preparation of *dolo*, there are several persons involved in different processing steps. Women who cook *dolo*, the *dolotières*, commonly do not cultivate the whole amount of needed red sorghum by themselves, but rather buy pre-prepared red sorghum from local female farmers (Interviews: woman C, T.; woman S, T.). Usually, women sell their pre-prepared products and processed food themselves or with the help of their children either in their village, at the local village market or at a market in a close town (Field notes 2013; FG women Bog.; Interviews: woman Z, Bog.; woman C, T.; amongst others).

In contrast to these foodstuffs, meat has been observed to be only prepared and sold by men (Field notes 2013; Interview: man J, T.). The same applies to other animal products like hide, which is used for example in the construction of chairs, and to all live animals themselves as well. Additionally, local cafés or small shops have been observed to be exclusively run by men, whereas women are particularly involved in selling *dolo* at *cabarets*, specific venues for sale and consumption of this alcoholic beverage in villages (Field notes 2013). Thus, processing but also selling of food, animals and other items show specific gendered structures, implying different income opportunities for women and men.

In regard to selling harvests, garden products are particularly lucrative. It has been observed that both women and men usually sell vegetables, which are produced in their own gardens, themselves. In the case of a commonly owned and cultivated garden, selling responsibilities are negotiated among the cultivators, but generally, it is possible for both, men as well as women, to sell a common harvest (Interview: woman E, Bous.).

These vegetables are then sold either directly at a local market or to middlemen, who are either traders from outside the village, region or even country, or other village inhabitants who do not have access to gardens themselves (FG women Bog.; Interviews: man M, Bog.; woman E, Bous.).

Concerning women's and men's involvement in selling crop fields' harvests, the differentiation between a household's fields and relative responsibilities play particularly important roles. As men are understood as household heads and land owners, they control the common fields' harvests that are usually primarily used for households' members' alimentation, but can also be sold to provide for various individual or common needs, including health care, education and investments in livestock farming. Harvests of individual fields are generally controlled by the respective owner, who is mostly a married woman but sometimes also a young man. These individual harvests, especially those of mothers, are most often also expected to contribute to the household's food provision, and most women noted that, even when they sell part of their personal harvest, they usually use their earnings for their families', in particular their children's needs, which include clothing, soap, health care and school fees. Crops that are specifically cultivated for sale are beans, groundnuts and sesame, while the latter was reported to be a newly introduced crop that is exclusively cultivated for sale and not consumed in the household at all (Interviews: man O, Bog.; woman Z, Bog.; man S, K.B.; woman A, K.B.; woman S, T.).

While garden products are usually sold right after harvesting, crops and livestock have been reported to be only sold in cases of acute financial demands. In turn, this also means that crops that are sold during the year are more expensive, as vendors try to get the best possible prices. "Une fois, quand les gens achètent et ils mettent dans les maisons, c'est pour chercher des profits. En ce moment ça devient plus chère que si c'est au moment où juste on vient de récolter" (FG men K.B.).

As has already been described, selling of livestock is perceived as particularly important and supportive by both women and men, but is exclusively undertaken by men. Rising livestock prices add to the importance of livestock ownership, as sales revenues are much higher than in former years. Some men in Toeghin exemplified this fact with their observation that about ten years ago, they couldn't sell an animal to buy a motorbike, which is now possible (FG men T.). These rising livestock prices have been explained by some elder men to derive from social and economic changes in the country, as people

generally buy and eat more meat, have more financial means than before and also because of a rapid population growth (Interviews: man L, K.B.; man S, T.).

**In conclusion**, processing of and therefore adding value to agricultural produce by generating foodstuff, including snacks, sweets and drinks, is exclusively conducted by women, whereas only men dispose animal products. It is also solely men who are involved in selling livestock, be it owned by themselves, by their wives or collectively by the household. In turn, selling of vegetables is conducted by the respective garden's owner and selling of a crop field's harvest is also undertaken by the person who was responsible for its cultivation. Common household fields and hence also their harvests fall into the male household head's sphere of responsibility. While they are usually primarily used for the household's alimentation, at least a significant part of women's individual harvests is also added to the household's food provision. Additionally, women's earnings from their crop sales are also frequently invested in their families, particularly in their children's daily needs but also in health and education issues.

## **7. Effects of changes and innovations on women's and men's livelihoods**

Various changes and innovations affect livelihood strategies and outcomes of women and men in local rural crop-livestock systems. Innovations are herein understood as the diffusion and adoption (Deji, 2011, p. 325) of new technologies in relation to RWM and agricultural activities. These innovations, their included actors, decision makers, beneficiaries as well as various gender-differentiated effects will be summarised and discussed in this chapter.

An important environmental change, particularly observed during the last ten years, is the increasing variability of rainfall patterns that negatively affect water availability and thus harvest outcomes of crop fields and gardens. This problem is compounded by a rapid population growth that contributes to smaller inherited fields for every new generation. Both changes result in the rising necessity to apply organic as well as chemical fertilizer. Still, acquiring both, enough manure and sufficient financial means to purchase chemical fertilizer, pose considerable difficulties for women as well as men. But women have been observed to face specific difficulties due to their constraints in

natural capital (land and water) access and in livestock ownership and control. Furthermore, men receive more fertilizer donations by organizations and institutions as well as earlier and more informations and trainings regarding fertilizer use and compost construction than women. It is also exclusively men who construct compost fosses, while women and children are predominantly implicated in producing compost. This compost, but also other available fertilizer, is first of all applied on the household's common field, controlled by the male household head. While this common field is usually primarily used for the whole household's food provision, only its owner controls harvest sales. Thus, other household members, particularly women, rely on additional fertilizer. This can be manure from their own animals or self-purchased fertilizer. Therefore, they face intensified difficulties in accessing enough fertilizer to sustain and boost their private fields' yields, needed to meet their various social and economic responsibilities in the context of scarce degrading land resources.

Next to fertilizer, RWM structures are also increasingly perceived as necessary to improve harvest outcomes of crop fields that provide for a household's alimentation and for income via crop sales. Informations and trainings are mostly received through village-external technical agents of various government-related institutions and NGOs that have distributed and reinforced RWM knowledge during the last years and decades. These initiatives again mainly incorporate men as recipients of information, skill-trainings and other support, which probably contributes to the perception of several activities relating to RWM such as the digging of *zai* or half-moons as being male-dominated. Contrary, the construction of stone bunds does imply considerable female labour as collecting and transporting stones has been observed as frequently conducted by women, if it is not done in the course of supportive projects. Generally, the construction of RWM techniques must be considered as time consuming, which limits their application on the driest and most unfertile fields, which are in greatest need of them. Furthermore selective RWM implementation has also been observed to prioritize larger fields and the ones that are considered as most important for the household's alimentation and basic needs. Therefore, RWM is more frequently implemented on a male household head's common field than on individual household member's smaller private fields. Taking into consideration that weeding with a *daba* is predominantly conducted by women, and that the utilization of ploughs for weeding is less easy in fields with *zai* or half-moons, women's time and labour input can be understood as particularly affected by the widespread implementation of RWM structures.

Another innovation aiming at reducing farmers' vulnerability to changing rainfall patterns is the use of seed varieties with a shorter growing cycle. These enable farmers to gain more crop harvest even in years with shorter rainy seasons and to harvest crops earlier, which is specifically important for a household's alimentation and for paying children's school fees. As these improved new seeds can be acquired by purchase at a local market or by participation in field trials organized by institutions or NGOs, access requires considerable financial and/or social capital, and thus several gender-differentiated constraints.

To further increase harvest outcomes and to facilitate cultivation ploughs are more and more utilized. While this tool and its cultivation technique have been observed to be already widely adopted in the Central Burkinabe research sites, it represents a rather recent innovation in the northern research villages. A significant change in access and utilization opportunities of a plough presents the emergence of a new smaller and lighter plough pulled by donkeys. This is primarily positively perceived by members of poorer household that do not have the financial capacity to buy and keep more expensive cattle. Especially in regard to central Burkinabe research sites this tendency cannot be confirmed at all, as women, wives as well as daughters, also plough common and private fields with donkeys as well as with cattle. Therefore, they decrease their dependence on male labour for their personal fields and gain a certain amount of autonomy in production, an indicator of empowerment in the Women's Empowerment in Agriculture Index (International Food Policy Research Institute, 2012). But still, they have not been observed to control the necessary productive resources, ploughs and animals, themselves, as they are still owned and controlled by men and use needs to be negotiated.

This male domination of agricultural labour due to increased plough utilization can, however, be partly observed in northern Burkinabe research villages as only men cultivate with ploughs and women indeed do not take part in the field's ploughing (so far). On the one hand, this may have subsequent effects on women's participation in other cultivation and livestock keeping tasks, increasing their time and energy use and possibly enhancing their decision making power. On the other hand, this can empower women insofar as it can increase their scarce leisure time and/or enable them to devote more energy and time in profitable processing activities (thus directly increasing their personal income), in their own education (increasing their human



capital), in enhanced child care, or in social networking (with various positive effects on leadership qualities, mutual support networks, self-esteem and income generation).

In addition to ploughs, the use of tractors can also facilitate and speed up cultivation tasks. But in contrast to ploughs, tractors are only accessible to and used by few farmers because of insufficient financial means to rent them. In order to be able to rent a tractor, which was only mentioned by one man, social capital appeared to be particularly important.

As the increased utilization of ploughs for field preparation and weeding generally enables farmers to devote more time and energy to other livelihood activities, this change determines other changes in livelihood strategies, most notably their diversification by engaging in gardening, intensified livestock keeping and marketing.

Gardening on fields surrounding *barrages* and other water sources in the dry season, but also on hill-side crop fields in the rainy season presents a rather new activity in all research sites. Its popularity has particularly increased during the last 15 years, since gardening techniques are more and more distributed by various institutions and organizations. Access to such informations and trainings, as well as to limited gardens around scarce local water resources, can be obtained by men as well as women, whereas social capital in the form of membership in local groups or associations significantly facilitates access. Garden land itself can be acquired either through male inheritance rights (implying gender-differentiated difficulties in accessing and controlling natural resources), through project-controlled distribution patterns (implying the relevance of social capital), or by renting (implying gender-differentiated difficulties in accessing and controlling financial capital). Generally, access constraints to gardens are worsened by a high population growth and subsequently increased competition. This competition is further increased by the reduced out-migration of young men, who prefer these new and improved local marketing and income possibilities provided by gardening to wage labour outside their village or even country.

Despite these access difficulties, gardening appeared to be perceived positively as it enables farmers to gain much-needed additional cash in the agricultural off-season that is otherwise mainly dedicated to livestock care and cultural activities. Still, it has to be acknowledged, that negative effects of increased gardening and irrigation use can include increasing workloads for local crop-livestock farmers. This can be especially the case for women, as gardening activities might not be conducted instead but be added

to their social and economic responsibilities in crop cultivation in the common as well as their private fields and in livestock care.

Another important change lies in farmers' perception on livestock keeping. Particularly in recent years local farmers perceive intensified livestock care as important and necessary. This is due to influential incentives such as high profitability of livestock selling because of rising animal prices and facilitated selling because of generally increased meat consumption by a higher population. Various effects on activities and habits in livestock farming include enhanced alimentation with fodder from crop fields' haulms and leaves as well as with additional purchased dietary supplements. Another effect is the provision of livestock health care, whereas veterinarian services are increasingly used and regular vaccinations seem to be conducted especially during the last four to ten years. While these changes increase livestock owners' income from sales, they also imply considerable access constraints to livestock keeping as more financial investments are required for animals' purchase and care.

Another gender-differentiated effect of this perception change on local farmers' livelihoods is the additional workload for women, who are predominantly implied in livestock's daily alimentation, watering and caring activities. This has been explained with the argument that women are more often "at the compound" than men are, due to their gender-specific responsibilities for food provision and other household tasks. Furthermore, women face specific constraints in providing required health care for their animals as access to livestock health services, which seem to be considered as men's responsibility, is denied to women. Therefore, they are dependent on their husbands and vulnerable to intra-household power dynamics about access to veterinarian services and vaccinations for their livestock.

Another change in relation to livestock keeping is the decreasing availability of land for pasture, which has been observed by farmers in the northern research villages in the last ten years. This also adds to women's daily tasks as livestock increasingly needs to be kept around the compound, being taken care of by women as well as by children.

Another major change in local women's and men's livelihoods has been described by the increased incorporation of markets and related selling, buying and reselling activities. While rising prices for various agricultural products and livestock, particularly in the last 10 to 20 years, and the general necessity to engage in marketing activities because of rising livelihood prices and additional payment pressures (particularly for education, health care, additional food purchase and livestock care) act

as important incentives, women and men are differentially affected in positive as well as negative ways. These include enhanced possibilities of acquiring financial capital for owners of physical assets as well as increased dependence on seasonal market dynamics.

Whereas gender-specific positive as well as negative effects of these changes have been stressed, generally, “the combined effects of increased assets, market access, reduced vulnerability, and improved information and organization can initiate an upward spiral of economic gain and empowerment for poor women as well as their families” (The World Bank, 2009, p. 103).

Environmental and economic changes as well as their induced changes in livelihood strategies and requirements may have contributed to an observed change in local social organization, as larger multigenerational *cours* tend to separate into largely independent compounds with smaller households. This enables more individual decision making on life and work organization and has been perceived as positive particularly by women who mentioned to enjoy improved access to agricultural tools and profit from a more flexible intra-household negotiation and allocation of tasks.

## **8. Conclusion**

Gender dynamics in rural crop-livestock systems in the Burkinabe Nakanbé basin are shaped by various gender-differentiated roles and responsibilities as well as by multiple interdependent changes in resource access, livelihood opportunities, and strategies.

As natural resources, in particular land and water, provide an essential basis for agricultural activities on which rural women and men rely for their own and their households' livelihoods sustainment, local farmers are particularly vulnerable to changes in rainfall patterns and to increasing land scarcity. Rainwater management structures are thus of crucial and growing importance to gain sufficient harvest outcomes in male-inherited crop fields that feed household members and provide necessary financial income for education, health care, livestock, agricultural inputs, and additional food purchases. Various rainwater management techniques are applied to households' common fields and, to a lesser degree, to individual household members', mostly wives', personal fields. Responsibilities related to these primarily gender-differentiated fields include, first of all, the provision of food for all household

members, whereas common fields, cultivated by all household members, are usually controlled by a male household head and personal fields, cultivated by individuals and respective hearth-hold dependents, also cater to the respective cultivators' needs. Generally, the larger common fields are prioritized with respect to labour input as well as technical and nutrient inputs.

Roles in cultivation and livestock keeping are distributed differently according to household members' gender and age. Working with a plough, which has been increasingly practised especially during the last ten years and reduces energy and time investments, is perceived as a male task. In contrast to northern research villages, women in Central Burkinabe research sites also frequently worked with ploughs drawn by cattle or donkeys, by themselves. While applying pesticides to crop fields is exclusively practised by men, other field tasks such as sowing, fertilizing, and weeding with a hoe are particularly often conducted by women. Furthermore, constructing rainwater management structures and harvesting were observed to contain several partly gender-differentiated tasks.

Growing vegetables in gardens around a suitable water source represents a rather new additional agricultural activity that has been increasingly practised in the last 15 years and generates comparatively high revenues for farmers during the dry season, the agricultural off-season. Gardening is conducted by women as well as men, whereas access possibilities to scarce gardens appeared to favour men due to inheritance rights, their higher financial means, and better connection to village-external institutions and NGOs.

Access to related agricultural input resources such as organic and chemical fertilizer, improved seed varieties adapted to a shorter rainy season, and agricultural tools is acquired through market purchase or through development-oriented cooperations. Thus, the financial and social capital, which is determined by access constraints to land and livestock that disfavour women as well as by local social power structures, is crucial in order to obtain necessary input resources that allow women and men to increase their harvest outputs and meet their various responsibilities and needs.

Livestock is perceived as a very important additional security, especially in times of environmental insecurity deriving from rainfall variability and increasingly scarce natural resources. Currently, the value of livestock increases due to rising market prices and social changes such as high population growth and rising meat consumption. Therefore, caring activities such as alimentation and health care are more intensely

practised in order to generate higher profits from market sales, which are exclusively conducted by men. Increased care particularly affects women's time and energy as they are primarily responsible for daily watering and feeding at the compound. Furthermore, rising care requires increasing financial investments in livestock farming and therefore leads to worse access possibilities to buying and keeping animals for poor farmers and in particular for women, if they are allowed to own livestock in their households.

These findings indicate that changes in a community's environmental, social, and economic vulnerability context as well as innovations in rainwater management and agriculture dynamically affect the livelihoods of women and men differently according to their age, social status, connection to social networks, and access possibilities to natural and physical assets. While men as well as women fulfil gender-specific roles and responsibilities in local crop-livestock systems with specific difficulties and different most-straining seasons, both provide relevant and necessary labour for their households' livelihoods. Therefore, their specific gender needs have to be recognised and better addressed by various cooperation partners in agricultural improvement initiatives. Including men as well as women into decision-making structures at all levels and considering and treating them as equal communication partners with experience in and expertise on life in resource-scarce settings can improve the effectiveness of various initiatives on sustainable local wellbeing, reducing potential gender-specific disempowering effects. Generally, access to extension services (including input resources, information, and credit) and to markets, control over physical capital as well as membership in local social groups bear the most important empowerment potentials for local farmers, particularly for women.

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